BOARD MEETING DATE: June 2, 2017 AGENDA NO. 29

PROPOSAL: Certify the Final Subsequent Environmental Assessment and Amend Rule 1147 - NOx Reductions from Miscellaneous Sources

SYNOPSIS: SCAQMD staff is proposing to amend Rule 1147 to reflect the recommendations made in the Final Rule 1147 Technology Assessment. Proposed Amended Rule 1147 would allow in-use equipment with NOx emissions less than one pound per day to defer compliance with applicable emission limits until the unit is replaced or the burner is replaced. The proposed amended rule would also increase the NOx emission limit for certain equipment categories that were identified in the Final Rule 1147 Technology Assessment and exempt new and existing equipment rated at less than 325,000 Btu per hour from the emissions limits of the rule. The proposed amended rule also provides options to demonstrate compliance and other minor changes are to improve clarity. PAR 1147 is expected to result in NOx emission reductions delay of up to 0.9 tons per day. However, the emission reductions will begin to be recaptured starting in 2017 because the existing units will be regularly replaced and upgraded over time, leaving less than 0.03 tons per day NOx emissions reductions foregone associated with the less than 325,000 Btu per hour exemption.

COMMITTEE: Stationary Source, April 21, 2017, Reviewed

RECOMMENDED ACTIONS:
Adopt the attached Resolution:
1. Certifying the Final Subsequent Environmental Assessment for Proposed Amended Rule 1147 - NOx Reductions from Miscellaneous Sources; and,
2. Amending Rule 1147 - NOx Reductions from Miscellaneous Sources.

Wayne Nastri
Executive Officer

PF:SN:TG:GQ:WB

Background

Rule 1147 – NOx Reductions from Miscellaneous Sources, was adopted by the SCAQMD Board on December 5, 2008 with a compliance schedule phased in over 10 years. Rule 1147 incorporates two 2007 AQMP control measures: CMB-01 – NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces; and MCS-01 – Facility Modernization. Rule 1147 was amended in September 2011 to delay implementation dates up to two years, remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. Rule 1147 includes a requirement for a technology assessment on the availability of low-NOx burner systems and their cost for processes with NOx emissions of one pound per day or less and that are not typically subject to a BACT requirement as new sources.

Technology Assessment

Initially the SCAQMD technology assessment focused on sources in which the burner technology was either not available or the retrofit cost was comparable to the cost of replacing the unit. Several categories of equipment, including construction and portable equipment, were identified and removed from Rule 1147 because the requirement for a permit was removed through the May 2013 amendments to SCAQMD Rules 219 and 222. Staff continued the technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens to move existing in-use food ovens, roasters and smokehouses from Rule 1147 into a separate rule. Rule 1153.1 was adopted on November 7, 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits, later compliance dates and an exemption for small units.

The last phase of the Technology Assessment focused on the remaining categories of small and low emission equipment that were not addressed through the Rule 219, 222 and 1153.1 rulemaking efforts. While the Technology Assessment focused on equipment with NOx emissions of 1 pound per day or less, the report also included information and analysis applicable to larger units. This information was included to address stakeholder concerns regarding the availability of technology for larger equipment.

With the exception of a few categories of equipment, the technology review demonstrated that low-NOx burner systems were available for every category of equipment subject to Rule 1147 and have been since the late 1990's. However, staff has identified three types of equipment for which low-NOx burners that achieve rule emission limits are not available or that cannot be retrofitted: 1) low-temperature ovens and dryers with heat inputs of less than 325,000 Btu per hour (0.325 mmBtu/hour) cannot comply with a 30 ppm emission limit but could comply with a higher limit; 2) existing heated process tanks, evaporators and parts washers cannot be retrofitted to meet an emission limit; and 3) low-temperature burn-off ovens and incinerators cannot comply with an emission limit of 30 ppm with the preferred burners.

Affected Facilities

Proposed Amended Rule (PAR) 1147 affects manufacturers, distributors and wholesalers of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the District. The units affected by the proposed rule are used in industrial, commercial and institutional settings for a wide variety of processes. Some examples of the processes regulated by the rule include metal casting and forging, coating and curing operations, asphalt manufacturing, and printing.

Based on permitted equipment in SCAQMD databases, staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (~ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the remaining units in each category will meet Rule 1147 emission limits without retrofitting burners. Staff estimates that 4,900 to 5,650 out of 6,400 units are affected by proposed changes to Rule 1147.

Public Process

For this rule amendment, staff held two Task Force meetings on January 17 and April 20, 2017 with representatives from businesses, manufacturers, trade organizations and other interested parties. During development of the Rule 1147 Technology Assessment, staff held several Task Force meetings every year since January 2012 to receive stakeholder input. In addition, staff has had individual meetings with stakeholders, and visited local businesses to observe operations and equipment covered by Rule 1147. A Public Workshop and CEQA scoping meeting for PAR 1147 was held on February 15, 2017.

Summary of Proposal

As a result of the technology assessment and discussions with stakeholders, the proposed amendments recognize technical and economic challenges for affected industries and provide additional relief from existing rule requirements. The following changes are proposed for Rule 1147:

- Exempt sources with total rated heat input less than 325,000 Btu per hour from the Rule 1147 NOx emission limit.
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of all burn-off ovens, burnout furnaces and incinerators.
- Exempt units with emissions less than 1 pound per day from complying with the NOx emission limit when an entire facility is relocated.
- Exempt equipment with direct-fired infrared burners from the requirement to conduct an emissions test.
- Add an exemption for units that become subject to the rule upon amendment of Rule 219.

- Provide an option for small units with heat input equal to or less than 2 million Btu/hour to demonstrate compliance with an emission limit through a burner manufacturer's warranty.
- Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until such time the combustion system or tank is modified or replaced.
- Delay compliance with the NOx emission limit for existing in-use spray booths until the unit is replaced or becomes 30 years old, or the heating system is modified (affecting the heat input rating) or replaced.
- Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified (affecting the heat input rating) or replaced, or the unit is replaced or becomes 30 years old.
- Clarify existing exemptions, definitions, and recordkeeping options.

The proposed amendments will provide affected businesses additional flexibility and will reduce cost.

Emission Reductions
If implemented, PAR 1147 is expected to result in delayed NOx emission reductions of up to 0.9 tons per day. Staff estimates that less than 0.05 ton/day of NOx emissions will be forgone because of the proposed changes to emission limits and exemptions including about 0.03 ton/day from the emission limit exemption for units rated less than 325,000 Btu per hour. However, with the exception of these emission reductions forgone, the remainder of the 0.9 tons per day will be made up as new rule-compliant equipment replaces existing units.

Key Issues
Throughout the finalization of the Rule 1147 Technology Assessment and the rule development process, staff has worked with stakeholders to address key issues. At the Stationary Source Committee on April 21, 2017, a business owner commented about temperature control issues with their low-NOx heater in their spray booth. The burner manufacturer has worked with the business owner and provided suggestions to address operating issues, and has offered to replace the burner with a more appropriately sized burner at no cost. Staff reported to the Board on May 5, 2017 that based on an informal survey of 72 businesses with spray booths using the same low NOx heaters, 68 businesses indicated that overheating was not a problem.

SCAQMD staff has committed to developing outreach material that provides a simple summary of rule requirements. Staff has already begun working with stakeholders to discuss the type of outreach material, distribution options, and general information that would be included to provide effective outreach to facility owners and operators.

AQMP and Legal Mandates

The California Health and Safety Code requires the SCAQMD to adopt an Air Quality Management Plan to meet state and federal ambient air quality standards and adopt rules and regulations that carry out the objectives of the AQMP. The Health and Safety Code also requires the SCAQMD to implement all feasible measures to reduce air pollution. Control Measure MCS-01 of the 2007 AQMP proposed that existing in-use equipment meet Best Available Control Technology (BACT) emission limits in place at the time the 2007 AQMP was adopted. Control Measure CMB-01 of the 2007 AQMP proposed emission NOx limits in the range of 20 ppm to 60 ppm for ovens, dryers, kilns, furnaces and other combustion equipment.

Rule 1147 relies on feasible technologies to further reduce NOx emissions to achieve the emission reductions proposed in the 2007 AQMP control measures. Rule 1147 anticipated reductions have already been reviewed and approved by both CARB and U.S. EPA and incorporated into the State Implementation Plan (SIP) as commitments, obligating SCAQMD to meet the emission reduction commitment attributed to the original rule and the 2011 amendment. The SCAQMD is required to cover any potential shortfall in emission reductions that may result from PAR 1147 or future amendments, if such a shortfall would interfere with reasonable further progress or attainment.

California Environmental Quality Act Analysis

The proposed amendments to Rule 1147 (PAR 1147) are considered to be modifications to a previously approved project (the adoption of Rule 1147 on December 5, 2008 and the amendments to Rule 1147 on September 9, 2011) and are considered to be a "project" as defined by the California Environmental Quality Act (CEQA). Therefore, a Subsequent Environmental Assessment (SEA) is the appropriate CEQA document. The previous CEQA documents to the SEA are publicly available upon request and can be reviewed by calling the SCAQMD Public Information Center at (909) 396-2001 or by visiting SCAQMD's website at www.aqmd.gov. The direct links to these documents are also referenced in the Final SEA. Based on SCAQMD staff's review of PAR 1147, the proposed project has the potential to generate significant adverse operational air quality impacts but that it would not generate significant adverse environmental impacts to any other environmental topic areas.

The Draft SEA was released for a 46-day public review and comment period from March 24, 2017 to May 9, 2017. Two comment letters were received and responses to the comments have been prepared. The comment letters and responses are included in an appendix to the Final SEA (see Appendix F). Since the release of the Draft SEA, minor modifications were made to PAR 1147 and some of the revisions were made in response to verbal and written comments on the project's effects. Staff has reviewed the modifications to PAR 1147 and concluded that none of the modifications constitute significant new information or a substantial increase in the severity of an environmental impact, nor provide new information of substantial importance relative to the draft document. In addition, revisions to PAR 1147 in response to verbal or written comments would not create new, significant effects. As a result, these minor revisions do not require recirculation of the Draft SEA pursuant to CEQA Guidelines § 15088.5. Thus, the Draft SEA has been revised to reflect the aforementioned modifications and to include the comment letters and responses to comments such that it is now a Final SEA (see Attachment H of this Board package).

Prior to making a decision on the adoption of PAR 1147, the SCAQMD Board must review and certify the Final SEA as providing adequate information on the potential adverse environmental impacts that may occur as a result of adopting PAR 1147.

Socioeconomic Analysis
The proposed amendments would extend the compliance schedule, make some emission limits less stringent, provide additional exemptions, and reduce emission testing requirements. These proposed amendments are based on technical feasibility considerations that were validated through a technology assessment and provide flexibility. Compared to the current rule requirements, PAR 1147 would delay and/or reduce implementation costs to affected businesses and facilitate compliance, thus resulting in overall cost-savings.

Resource Impacts
Existing staff resources are adequate to implement the proposed amended rule.

Attachments
A. Summary of Proposal
B. Key Issues and Responses
C. Rule Development Process
D. Key Contacts List
E. Resolution and Attachment 1 to the Resolution
F. Proposed Amended Rule 1147
G. Final Staff Report with Socioeconomic Impact Analysis
H. Final Subsequent Environmental Assessment
I. Board Meeting Presentation

ATTACHMENT A

SUMMARY OF PROPOSAL

Proposed Amended Rule 1147 - NOx Reductions from Miscellaneous Sources

- Remove the requirement to comply with an emission limit for units with a heat input rating of less than 325,000 Btu/hour [Table 1, (c)(1)]. These units would still be subject to maintenance and recordkeeping requirements;
- Change the NOx emission limit for low-temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm [Table 1, (c)(1)];
- Change the compliance date for small in-use units (with NOx emissions of less than one pound per day) from a schedule based on a 20-year lifetime to a 30-year lifetime or when the units are replaced or retrofit [(c)(1) and (c)(6)];
- Provide compliance flexibility for low-emission units by clarifying options for demonstrating emissions less than one pound per day [(c)(6)];
- Add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee [(d)(1) – (d)(11)];
- Change the compliance date for existing in-use heated process tanks and pressure washers from a schedule based on a 15-to-20-year lifetime to when the units are replaced or retrofit. These units would not be required to comply with an emission limit at any specific age and may be relocated with a facility move [(g)(8) and (g)(11)];
- Add a testing exemption for ultra-low NOx infrared burners [(g)(9)];
- Add an exemption for units that become subject to the rule upon amendment of Rule 219 [(g)(10)];
- Add an exemption for units with emission less than 1 pound per day when a company relocates a facility and remains under the same ownership [(g)(11)];
- Clarify an exemption for food ovens [(a), (g)(1), and (g)(2)]; and
- Clarify an exemption for flare type systems [(g)(3)(E)].

ATTACHMENT B

KEY ISSUES AND RESPONSES

Proposed Amended Rule 1147 - NOx Reductions from Miscellaneous Sources
Issue – Low-NOx heaters for automobile refinishing spray booths ***Response:*** *Concerns were raised by stakeholders regarding temperature control of low-NOx heaters for certified spray booth heaters and the availability of low-NOx burners from other suppliers. Staff conducted a survey of owners and operators of spray booths with low NOx heaters to determine if temperature control issues were common. The results of the survey indicated that overheating was not a common problem and may be related to temperature sensors and the heater temperature control systems purchased by individual operators. The company that provides the low NOx burner for 14 manufacturers of heaters also provided burners to the majority of these manufacturers before Rule 1147 was adopted. Two spray booth heaters using two other companies' burners have also demonstrated compliance with the rule emission limit through emission testing. These test results are summarized and discussed in the Rule 1147 Technology Assessment. Staff will continue to work with the business owner who experienced problems with their spray booth heater.* **Issue** – Outreach to Businesses ***Response:*** *SCAQMD staff has committed to developing an implementation guidance document to help businesses comply with rule requirements. In addition, staff will work with stakeholders to provide outreach materials after the rule is adopted. Staff has initiated this process and held one meeting with stakeholders.*

ATTACHMENT C

RULE DEVELOPMENT PROCESS

Proposed Amended Rule 1147 – NOx Reductions from Miscellaneous Sources

Draft Technology Assessment Made Available to Public
January 2016

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Third-Party Review of Technology Assessment Completed
November 2016

↓

Technology Assessment Finalized
January 2017

↓

Initial Rule Development
December 2016/January 2017

↓

Public Process for Rule Development

- 2 Task Force Meetings
- Public Workshop: February 15, 2017
- Stationary Source Committee: April 21, 2017

Approximately 7,200 notices of the public workshop were mailed to regulated community, equipment manufacturers, trade associations, equipment suppliers, equipment installers and other interested parties.

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CEQA Drafts EA Released for
46-Day Review
Release Date: March 24, 2017

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Set Public Hearing: May 5, 2011

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Public Hearing: June 2, 2017

Seven (7) months spent in rule development and 5 years in technology assessment.

ATTACHMENT D

KEY CONTACTS LIST

AMVAC
California Auto Body Association
California Small Business Alliance
E4 Strategic Solutions
Eclipse
ETS, Inc.
Furnace Dynamics
George T. Hall Company
Handbill Printers
IPE
J.R. Sandoval Enterprises
MAACO
Maximum Technical Services
Maxon Corporation
Midco International
Printing Industries Association of Southern California
Relyon Technologies
Southern California Gas Company
U.S. EPA
Wirth Gas Equipment, Inc.

ATTACHMENT E

RESOLUTION NO. 17-______

A Resolution of the Governing Board of the South Coast Air Quality Management District (SCAQMD) certifying the Final Subsequent Environmental Assessment for Proposed Amended Rule 1147 - NOx Reductions from Miscellaneous Sources.

A Resolution of the SCAQMD Governing Board amending Rule 1147 - NOx Reductions from Miscellaneous Sources.

WHEREAS, the SCAQMD Governing Board finds and determines with certainty that Proposed Amended Rule 1147 is considered a modification to a previously approved project (the adoption of Rule 1147 on December 5, 2008 and the amendments to Rule 1147 on September 9, 2011) and is considered to be a "project" as defined by the California Environmental Quality Act (CEQA); and

WHEREAS, the SCAQMD has had its regulatory program certified pursuant to Public Resources Code § 21080.5 and CEQA Guidelines § 15251(l) and has conducted CEQA review and analysis pursuant to such program (SCAQMD Rule 110); and

WHEREAS, the SCAQMD staff reviewed Proposed Amended Rule 1147 and determined that it may have the potential to generate significant adverse environmental impacts; and

WHEREAS, the SCAQMD Governing Board has determined that the requirements for a Subsequent Environmental Impact Report (EIR) have been triggered pursuant to CEQA Guidelines § 15162, and that a Subsequent Environmental Assessment (SEA), a substitute document allowed pursuant to CEQA Guidelines § 15252 and SCAQMD's certified regulatory program, is appropriate; and

WHEREAS, SCAQMD staff has prepared a Draft SEA pursuant to CEQA Guidelines § 15162 and its certified regulatory program and pursuant to CEQA Guidelines § 15252, setting forth the potential environmental consequences of Proposed Amended Rule 1147; and

WHEREAS, the Draft SEA was circulated for a 46-day public review and comment period from March 24, 2017 to May 9, 2017; and

WHEREAS, two comment letters were received relative to the analysis presented in the Draft SEA and responses were prepared for each individual comment in the letters. None of the comments in these comment letters identified other potentially significant adverse impacts from the proposed project, and the Draft SEA has been revised such that it is now a Final SEA; and

WHEREAS, it is necessary that the adequacy of the Final SEA, including responses to comments, be determined by the SCAQMD Governing Board prior to its certification; and

WHEREAS, it is necessary that the SCAQMD prepare Findings and a Statement of Overriding Considerations pursuant to CEQA Guidelines § 15091 and § 15093, respectively, regarding potentially significant adverse environmental impacts that cannot be mitigated to insignificance; and

WHEREAS, Findings and a Statement of Overriding Considerations have been prepared and are included in Attachment 1 to this Resolution, which is attached and incorporated herein by reference; and

WHEREAS, no feasible mitigation measures were identified to reduce or eliminate the significant adverse operational air quality impacts to less than significant and, as such, a Mitigation Monitoring Plan pursuant to Public Resources Code § 21081.6 is not required and was not prepared; and

WHEREAS, the Board package includes the Final SEA and other supporting documentation, and this information was presented to the SCAQMD Governing Board and that the Board has reviewed and considered the entirety of this information before approving the staff recommendations; and

WHEREAS, the SCAQMD Governing Board voting on Proposed Amended Rule 1147 has reviewed and considered the Final SEA, including responses to comments, the Findings, and Statement of Overriding Considerations, and all other supporting documentation, prior to the certification of the Final SEA; and

WHEREAS, the SCAQMD Governing Board finds and determines, taking into consideration the factors in Section (d)(4)(D) of the Governing Board Procedures (codified as Section 30.5(4)(D) of the Administrative Code), that the modifications which have been made to Proposed Amended Rule 1147, since notice of public hearing was published, do not significantly change the meaning of the proposed amended rule within the meaning of Health and Safety Code § 40726 and would not constitute significant new information requiring recirculation of the Draft SEA pursuant to CEQA Guidelines § 15088.5; and

WHEREAS, California Health and Safety Code § 40727 requires that prior to adopting, amending or repealing a rule or regulation, the SCAQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report; and

WHEREAS, the SCAQMD Governing Board obtains its authority to adopt, amend, or repeal rules and regulations from §§ 39002, 40000, 40001, 40440, 40441, 40702, 40725 through 40728, 41508, and 41700 of the California Health and Safety Code; and

WHEREAS, the SCAQMD Governing Board has determined that there is a problem that Proposed Amended Rule 1147 will help alleviate by delaying the NOx emission limit compliance dates and changing NOx emission limits to address feasibility issues; and

WHEREAS, the SCAQMD Governing Board has determined that a need exists to amend Rule 1147 to delay the NOx emission limit compliance dates and change NOx emission limits to address feasibility issues; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147, as proposed is written or displayed so that its meaning can be easily understood by the persons directly affected by it; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147, as proposed, is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions, or regulations; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147, as proposed, does not impose the same requirements as any existing state or federal regulation and the proposed amended rule is necessary and proper to execute the powers and duties granted to, and imposed upon, the District; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147, as proposed, references the following statutes which the SCAQMD hereby implements, interprets or makes specific: Health and Safety Code 40001(a) (rules to meet air quality standards); 40440(a) (rules to carry out the plan); 40702 (adoption of rules and regulations); and

WHEREAS, the SCAQMD Governing Board finds that Proposed Amended Rule 1147 does not impose a new emission limit or standard, make an existing emission limit or standard more stringent, or impose new or more stringent requirements and that Proposed Amended Rule 1147 falls within one or more subcategories of Health and Safety Code § 40727.2; and

WHEREAS, the SCAQMD Governing Board has determined that the Socioeconomic Impact Assessment of Proposed Amended Rule 1147 is consistent with the March 17, 1989 Governing Board Socioeconomic Resolution for rule adoption; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147 will result in cost savings to the affected owner/operators as analyzed in the Socioeconomic Impact Assessment, as contained in the Final Staff Report; and

WHEREAS, the SCAQMD Board has actively considered the Socioeconomic Impact Assessment, as contained in the Final Staff Report, and has made a good faith effort to minimize any adverse socioeconomic impacts; and

WHEREAS, the SCAQMD Governing Board has determined that the Socioeconomic Impact Assessment is consistent with the provisions of the Health and Safety Code Sections 40440.8, 40728.5, 40920.6; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147 will not result in increased costs; and

WHEREAS, the SCAQMD Governing Board has determined that Proposed Amended Rule 1147 will not result in emission reductions, and therefore no incremental cost analysis is required under Health and Safety Code § 40920.6; and

WHEREAS, a public hearing has been properly noticed in accordance with the provisions of Health and Safety Code § 40725; and

WHEREAS, the SCAQMD Governing Board has held a public hearing in accordance with all provisions of law; and

WHEREAS, the SCAQMD Governing Board specifies the Manager of Proposed Amended Rule 1147 as the custodian of the documents or other materials which constitute the record of proceedings upon which the adoption of this proposed project is based, which are located at the South Coast Air Quality Management District, 21865 Copley Drive, Diamond Bar, California; and

NOW, THEREFORE, BE IT RESOLVED, that the SCAQMD Governing Board does hereby certify the Final SEA for Proposed Amended Rule 1147, including responses to comments and other supporting documentation, was completed in compliance with CEQA; and finds that the Final SEA was presented to the Governing Board, whose members reviewed, considered and approved the information therein prior to acting on Proposed Amended Rule 1147, and finds that the Final SEA reflects the SCAQMD's independent judgment and analysis; and

BE IT FURTHER RESOLVED, that the SCAQMD Governing Board adopts the Findings and Statement of Overriding Considerations pursuant to CEQA Guidelines § 15091 and § 15093, respectively, as required by CEQA and which are included in Attachment 1 to this Resolution and incorporated herein by reference; and

BE IT FURTHER RESOLVED, since no feasible mitigation measures were identified to reduce or eliminate the significant adverse operational air quality impacts to less than significant, a Mitigation Monitoring Plan pursuant to Public Resources Code § 21081.6 and CEQA Guidelines § 15097 is not required and was not prepared; and

BE IT FURTHER RESOLVED, that the SCAQMD Governing Board requests that Proposed Amended Rule 1147 be submitted into the State Implementation Plan; and

BE IT FURTHER RESOLVED, that the Executive Officer is hereby directed to forward a copy of this Resolution and Proposed Amended Rule 1147 to the California Air Resources Board for approval and subsequent submittal to the U.S. Environmental Protection Agency for inclusion into the State Implementation Plan; and

BE IT FURTHER RESOLVED, that the SCAQMD Governing Board hereby directs staff to work with stakeholders to conduct outreach and help guide facilities subject to Rule 1147 through the applicable rule requirements; and

BE IT FURTHER RESOLVED, that the SCAQMD Governing Board does hereby adopt, pursuant to the authority granted by law, amendments to Rule 1147 **-** NOx Reductions from Miscellaneous Sources, as set forth in the attached and incorporated herein by reference.

Dated:____________________ ______________________________________

Clerk of the District Boards

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Attachment 1 to the Governing Board Resolution for:
Final Subsequent Environmental Assessment to the December 2008 Final Environmental Assessment for Proposed Rule 1147 – NOx Reductions from Miscellaneous Sources, and to the September 2011 Final Subsequent Environmental Assessment for Proposed Amended Rule 1147 – NOx Reductions from Miscellaneous Sources

Findings and Statement of Overriding Considerations

SCAQMD No. 03172017SW
State Clearinghouse No: 2009061088

May 2017

Executive Officer
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SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
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Supervisor, Second District
County of San Bernardino

EXECUTIVE OFFICER:
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INTRODUCTION

The proposed amendments to Rule 1147 - NOx Reductions From Miscellaneous Sources, are considered a "project" as defined by the California Environmental Quality Act (CEQA) (California Public Resources Code §§ 21000 et seq.). The SCAQMD as Lead Agency for the proposed project, prepared a Notice of Preparation/Initial Study (NOP/IS) which identified environmental topics to be analyzed in a Draft Environmental Assessment (EA). Since PAR 1147 was identified in the NOP/IS as potentially having statewide, regional or areawide significance, a CEQA scoping meeting is required (pursuant to Public Resources Code Section 21083.9(a)(2)) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017.

The NOP/IS provided information about the proposed project to other public agencies and interested parties prior to the intended release of the Draft EA. The NOP/IS was distributed to responsible agencies and interested parties for a 30-day review and comment period from February 1, 2017, to March 3, 2017. The initial evaluation in the NOP/IS identified the topic of operational air quality as potentially having potentially significant adverse impacts requiring further review. During the public comment period, the SCAQMD received two comment letters relative to the NOP/IS.

Following the release of the NOP/IS, further analysis of the proposed project indicated that the type of CEQA document appropriate for the proposed project is a Subsequent Environmental Assessment (SEA), in lieu of an EA. The SEA is a substitute CEQA document, prepared in lieu of a Subsequent EIR (CEQA Guidelines § 15162(b)), pursuant to the SCAQMD's Certified Regulatory Program (CEQA Guidelines § 15251(l); codified in SCAQMD Rule 110). . Therefore, a SEA is appropriate because new information of substantial importance, which was not known and could not have been known at the time the Final EA was certified for the adoption of Rule 1147 in December 2008 (referred to herein at the December 2008 Final EA) and the Final Subsequent EA that was certified for the amendments to Rule 1147 in September 2011 (referred to herein as the September 2011 Final SEA), became available (CEQA Guidelines § 15162(a)(3)). Further, PAR 1147 is expected to have significant effects that were not discussed in the previous December 2008 Final EA or September 2011 Final SEA (CEQA Guidelines § 15162(a)(3)(A)). In the event that new information becomes available that would change a project, the lead agency shall prepare a subsequent Environmental Impact Report (EIR) (CEQA Guidelines § 15162(b)). However, under SCAQMD's certified regulatory program, an equivalent document, a subsequent EA, can be a substitute for preparing a subsequent EIR.

The SEA is also a public disclosure document intended to: 1) provide the lead agency, responsible agencies, decision makers and the general public with information on the environmental impacts of the proposed project; and 2) be used as a tool by decision makers to facilitate decision making on the proposed project.

Thus, the SCAQMD, as lead agency for the proposed project, has prepared the Draft SEA pursuant to its Certified Regulatory Program. The Draft SEA identified and analyzed the topic of operational air quality as the only area that may have significant adverse impacts if the proposed project is implemented. The Draft SEA concluded that only the topic of operational air quality emission impacts would have significant adverse impacts. Because PAR 1147 may have statewide, regional or areawide significance, a CEQA scoping meeting was required for the proposed project pursuant to Public Resources Code § 21083.9(a)(2) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017. Further, pursuant to CEQA Guidelines § 15252, since significant adverse impacts were identified, an alternatives analysis and mitigation measures are required. However, since PAR 1147 contains adjustments to compliance dates for certain types of equipment and alternatives to the project that are either the 'no project' alternative, or different adjustments to the compliance dates than what is proposed in PAR 1147 (see Chapter 5 of the Final SEA), the analysis in the Final SEA concluded that there are no feasible mitigation measures that would eliminate or reduce the significant adverse operational air quality impacts for NOx emissions to less than significant levels.

The Draft SEA was released for a 46-day public review and comment period from March 24, 2017 to May 9, 2017. The comments made at the CEQA scoping meeting and the responses to these comments are included in Appendix D of this Final SEA. The comment letters received relative to the NOP/IS and the responses to the comments are included in Appendix E of the Final SEA. In addition, all comments received during the public comment period on the analysis presented in the Draft SEA have been responded to and included in Appendix F of the Final SEA.

Subsequent to release of the Draft SEA, modifications were made to PAR 1147 and some of the revisions were made in response to verbal and written comments on the project's effects. At the time the Draft SEA was released for public review and comment, the estimate of total NOx emission reductions foregone of 0.9 ton per day included the portion of emission reductions foregone attributable to the original proposal to increase the NOx compliance limit for low temperature ovens and other units with a heat rating less than 325,000 BTU/hour until 2044. However, subsequent to the release of the Draft SEA, the proposed project was modified to fully exempt all units, not just low temperature units, in this category. The effect of exempting these units is now expected to have permanent, instead of temporary, NOx emission reductions foregone of approximately 49 pounds per day, which is less than the NOx significance threshold of 55 pounds per day. Staff has reviewed the modifications to PAR 1147 and concluded that none of the modifications constitute significant new information or a substantial increase in the severity of an environmental impact, nor provide new information of substantial importance relative to the draft document. In addition, revisions to PAR 1147 in response to verbal or written comments would not create new, avoidable significant effects. As a result, these revisions do not require recirculation of the Draft SEA pursuant to CEQA Guidelines § 15088.5.

SUMMARY OF THE PROPOSED PROJECT

SCAQMD staff is proposing to amend Rule 1147 – NOx Reductions from Miscellaneous Sources, in order to resolve compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would:

- remove the requirement to comply with the NOx emission limit for units with a heat input rating of less than 325,000 British Thermal Units per hour (BTU/hour). These units would still be subject to maintenance and recordkeeping requirements;
- change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm;
- change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 30 year lifetime or until the units are replaced or retrofit;
- change the compliance date for existing in-use heated process tanks and pressure washers from a schedule based on a 15 year to 20 year lifetime to when the units are replaced or retrofit. These units would not be required to comply with an emission limit at any specific age and may be relocated with a facility move;

- add a testing exemption for ultra-low NO_x infrared burners;
- provide compliance flexibility for low emission units by clarifying options for demonstrating emissions less than one pound per day;
- add an exemption for units with emission less than one pound per day when a company relocates a facility and remains under the same ownership;
- add an exemption for units that become subject to the rule upon amendment of Rule 219 on or after May 5, 2017, until the unit is replaced;
- add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee;
- clarify an exemption for food ovens; and
- clarify an exemption for flare type systems.

If adopted, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day in 2017. However, while most of the estimated NOx emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time, approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent (see the Final SEA, Table 4-3). Other minor changes are also proposed for clarity and consistency throughout the rule.

SIGNIFICANT ADVERSE IMPACTS WHICH CAN BE REDUCED BELOW A SIGNIFICANT LEVEL OR WERE CONCLUDED TO BE INSIGIFICANT

The Final SEA identified air quality as an area that may be adversely affected by the proposed project. The proposed project was evaluated according to the CEQA environmental checklist of approximately 17 environmental topics for potential adverse impacts from a proposed project. The screening analysis concluded that the following environmental areas would not be significantly adversely affected by the proposed project:

- aesthetics
- air quality and greenhouse gases during construction (and greenhouse gases during operation)
- agriculture and forestry resources
- biological resources
- cultural resources
- energy
- geology and soils
- hazards and hazardous materials
- hydrology and water quality
- land use and planning
- mineral resources
- noise

- population and housing
- public services
- recreation
- solid and hazardous waste
- transportation and traffic

POTENTIAL SIGNIFICANT ADVERSE IMPACTS THAT CANNOT BE REDUCED BELOW A SIGNIFICANT LEVEL

The Final SEA identified the topic of operational air quality as the only area that may be significantly adversely affected by the proposed project.

Operational Air Quality Impacts

Of the amendments proposed in PAR 1147, only the amendment to delay the compliance for NOx emission limits and the exempt units with a heat rating less than 325,000 BTU/hour would have significant adverse operational air quality impacts. The air quality analysis for PAR 1147 in the Final SEA indicates that NOx emission reductions delayed during operation will continue to exceed the NOx operational significance threshold for each compliance year in 2017 and beyond. Thus, the operational air quality impacts from implementing PAR 1147 are considered to be significant. If significant adverse environmental impacts are identified in a CEQA document, the CEQA document shall describe feasible measures that could minimize the impacts of the proposed project. However, since PAR 1147 contains adjustments to compliance dates for certain types of equipment and alternatives to the project that are either the 'no project' alternative, or different adjustments to the compliance dates than what is proposed in PAR 1147, there are no feasible mitigation measures that would eliminate or reduce the significant adverse operational air quality impacts for NOx emissions to less than significant levels.

It is important to note that because PAR 1147 focuses on reducing NOx emissions, emissions of other criteria pollutants (e.g., CO, VOC, SOx, PM10, and PM2.5) and toxic air contaminants are not expected to change as a result of PAR 1147 compared with the current requirements for the affected sources under Rule 1147. Thus, PAR 1147 will not result in significant adverse operational air quality impacts for CO, VOC, SOx, PM10, PM2.5 and toxic air contaminants.

FINDINGS

Public Resources Code § 21081 and CEQA Guidelines § 15091(a) state that no public agency shall approve or carry out a project for which a CEQA document has been completed which identifies one or more significant adverse environmental effects of the project unless the public agency makes one or more written findings for each of those significant effects, accompanied by a brief explanation of the rationale for each finding. Additionally, the findings must be supported by substantial evidence in the record (CEQA Guidelines § 15091(b)). As identified in the Final SEA and summarized above, the proposed project has the potential to create significant adverse operational air quality impacts. The SCAQMD Governing Board, therefore, makes the following findings regarding the proposed project. The findings are supported by substantial evidence in the record as explained in each finding. These Findings will be included in the record of project approval and will also be noted in the Notice of Decision. The Findings made by the SCAQMD Governing Board are based on the following significant adverse impact identified in the Final SEA.

Potential NOx emission reductions delayed and permanently foregone exceed the SCAQMD's applicable significance air quality thresholds and cannot be mitigated to insignificance.

Finding and Explanation:
As explained earlier, except for NOx emissions, no other criteria pollutant or toxic air contaminant emissions exceed the SCAQMD's applicable significance thresholds during operation. Thus, PAR 1147 is concluded to result in adverse significant operational NOx air quality impacts.

The Governing Board finds that there are no feasible mitigation measures that would eliminate or reduce the significant adverse operational air quality impacts for NOx emissions to less than significant levels. CEQA defines "feasible" as "capable of being accomplished in a successful manner within a reasonable period of time, taking into account economic, environmental, social, and technological factors" (Public Resources Code § 21061.1).

The Governing Board finds further that the Final SEA considered alternatives pursuant to CEQA Guidelines § 15126.6, but, aside from the No Project Alternative, no project alternatives would reduce to insignificant levels the significant air quality impacts identified for the proposed project and still achieve the objectives of the proposed project. The administrative record for the CEQA document and adoption of the rule amendments is maintained by the Office of Planning, Rule Development and Area Sources.

Conclusion
The Governing Board finds that the findings required by CEQA Guidelines § 15091(a) are supported by substantial evidence in the record. The record of approval for this project may be found in the SCAQMD's Clerk of the Board's Office located at SCAQMD headquarters in Diamond Bar, California.

STATEMENT OF OVERRIDING CONSIDERATIONS
If significant adverse impacts of a proposed project remain after incorporating mitigation measures or no measures or alternatives to mitigate the adverse impacts are identified, the lead agency must make a determination that the benefits of the project outweigh the unavoidable adverse environmental effects if it is to approve the project. CEQA requires the decision-making agency to balance, as applicable, the economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project against its unavoidable environmental risks when determining whether to approve the project [CEQA Guidelines § 15093(a)]. If the specific economic, legal, social, technological, or other benefits, including region-wide or statewide environmental benefits, of a proposed project outweigh the unavoidable adverse environmental effects, the adverse environmental effects may be considered "acceptable" [CEQA Guidelines § 15093 (a)]. Accordingly, a Statement of Overriding Considerations regarding potentially significant adverse operational NOx air quality impacts resulting from the proposed project has been prepared. This Statement of Overriding Considerations is included as part of the record of the project approval for the proposed project. Pursuant to CEQA Guidelines § 15093(c), the Statement of Overriding Considerations will also be noted in the Notice of Decision for the proposed project.

Despite the inability to incorporate changes into the proposed project that will mitigate potentially significant adverse operational air quality impacts to a level of insignificance, the SCAQMD's

Governing Board finds that the following benefits and considerations outweigh the significant unavoidable adverse environmental impacts:

1. The analysis of potential adverse environmental impacts incorporates a "worst-case" approach. This entails the premise that whenever the analysis requires that assumptions be made, those assumptions that result in the greatest adverse impacts are typically chosen. This method likely overestimates the actual emission reductions delayed from the proposed project.

2. The potential adverse impacts from implementing PAR 1147 consist of delay in anticipated NOx emission reductions and small amount of permanent emission reduction foregone, not emission increases.

3. Despite the delay in some of the compliance dates, most NOx emission reductions foregone are expected to be recovered each year based on up to 0.9 ton per day from compliance year 2017 to 2044. The permanent emission reductions foregone are estimated to be 0.03 ton per day.

4. In consideration of the total net accumulated emission reductions projected overall, the delay in NOx emission reductions would not interfere with the air quality progress and attainment demonstration projected in the AQMP. The 2012 AQMP allocated one ton per day of NOx emissions in the SIP set aside account for every year starting in year 2013 to year 2030 in the event that NOx emission reductions were not achieved via rule adoptions or amendments. This NOx set aside account was re-evaluated and revised in the Final 2016 AQMP based on expected growth and the number of projects expected to take place in near future years to 2.0 tons per day for every year starting in year 2017 to year 2025 and 1.0 ton per day for every year starting in year 2026 to year 2031. As a result, even though PAR 1147 would delay NOx emission reductions and exempt some units, implementation of other control measures in the 2016 AQMP will provide human health benefits by reducing population exposures to existing NOx emissions. The cumulative air quality impacts from the proposed project and all other AQMP control measures, when considered together, are not expected to be significant because ongoing implementation of AQMP control measures is expected to result in net emission reductions and overall air quality improvement.

5. The proposed project will help relieve certain affected industries of the compliance challenges currently being experienced by certain affected sources with the existing Rule 1147 and ensures that equipment owners/operators are not unnecessarily burdened with compliance costs.

The SCAQMD's Governing Board finds that the aforementioned considerations outweigh the unavoidable significant effects to the environment as a result of the proposed project.

MITIGATION MONITORING PLAN

When making findings as required by Public Resources Code § 21081 and CEQA Guidelines § 15091, the lead agency must adopt a reporting or monitoring program for the changes to the project which it has adopted or made a condition of project approval in order to mitigate or avoid significant effects on the environment (Public Resources Code § 21081.6 and CEQA Guidelines § 15097[a]). However, SCAQMD found there are no feasible mitigation measures that would eliminate or reduce the significant adverse operational air quality impacts for NOx emissions to less than significant levels. Therefore, no mitigation monitoring plan has been developed for PAR 1147 at this time.

CONCLUSION

Based on a "worst-case" analysis, the potential adverse operational air quality impacts from the adoption and implementation of PAR 1147 are considered significant and unavoidable. No feasible mitigation measures have been identified that would reduce the operational air quality impacts associated with implementing the PAR 1147 from the entire project to less than significant levels. Further, no project alternatives have been identified that would reduce these impacts to insignificance.

ATTACHMENT F

(Adopted December 5, 2008) (Amended September 9, 2011)(Date of adoption)

RULE 1147 NOx REDUCTIONS FROM MISCELLANEOUS SOURCES

(a) Purpose and Applicability

The purpose of this rule is to reduce nitrogen oxide emissions from gaseous and liquid fuel fired combustion equipment as defined in this rule. This rule applies to manufacturers, distributors, retailers, installers, owners, and operators of ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules. This rule does not apply to solid fuel-fired combustion equipment, internal combustion engines ~~subject to District Rule 1110.2~~, turbines, food ovens, charbroilers, ~~or~~ boilers, water heaters, thermal fluid heaters, ~~and~~ enclosed process heaters ~~subject to District Rules 1109, 1146, 1146.1, or 1146.2~~ and other combustion equipment subject to nitrogen oxide limits of other District Regulation XI rules ~~1111, 1112, 1117, 1118, 1121, or 1135~~.

(b) Definitions

(1) ANNUAL CAPACITY FACTOR means the ratio of the ANNUAL HEAT INPUT of a unit in a calendar year to the amount of fuel it could have burned if it had operated at the rated heat input capacity for 100 percent of the time during the calendar year.

(2) ANNUAL HEAT INPUT means the actual amount of heat released by fuels burned in a unit during a calendar year, based on the fuel's higher heating value.

(3) BTU means British thermal unit or units.

(4) COMBUSTION SYSTEM MODIFICATION means ~~replacement of a~~ any modification of burner(s) or heating unit that contains a burner(s), or burner(s) fuel system, combustion air supply, or combustion control system that changes the RATED HEAT INPUT CAPACITY of the burner(s) or heating unit.

(5) COMBUSTION SYSTEM REPAIR means fixing or refurbishing of a burner(s) or heating unit that contains a burner(s), or burner(s) fuel system,

combustion air supply, or combustion control system that does not result in a COMBUSTION SYSTEM MODIFICATION or COMBUSTION SYSTEM REPLACEMENT.

(6) COMBUSTION SYSTEM REPLACMENT means the substituting of a burner(s) or a heating unit that includes a burner(s).

(7~~5~~) FOOD OVEN means an oven, cooker, dryer, roaster, or other fuel-fired unit, excluding fryer, used to heat, ~~or~~ cook, dry, roast, or prepare food, food products, or products used for making beverages for human consumption.

(8~~6~~) HEATER means any combustion equipment that is fired with gaseous and/or liquid fuels and which transfers heat from combusted fuel to materials or air contained in the unit or in an adjoining cabinet, container or structure. Heater does not include any boiler or PROCESS HEATER designed to transfer heat to water or process streams that is subject to any NOx emission limits of District Rules 1109, 1146, 1146.1 or 1146.2, and does not include any internal combustion engine or turbine.

(9~~7~~) HEAT INPUT means the higher heating value of the fuel to the unit measured as BTU per hour.

(10~~8~~) HEAT OUTPUT means the enthalpy of the working fluid output of the unit.

(11) INFRARED BURNER means a burner with:

(A) Ceramic, metal fiber, sintered metal, or perforated metal flame-holding surface;

(B) More than 50% of the heat output as infrared radiation and that is operated in a manner where the zone including and above the flame-holding surface is red and does not produce observable blue or yellow flames in excess of ½ inch (13 mm) in length; and

(C) A RATED HEAT INPUT CAPACITY per square foot of flame holding surface of 100,000 BTU per hour or less.

(12~~9~~) IN-USE ~~UNIT~~ means ~~any UNIT that~~ is demonstrated to the Executive Officer that a UNIT~~it~~ was in operation at the current location prior to January 1, 2010.

(13~~0~~) MAKE-UP AIR HEATER means a UNIT used to heat incoming air in order to maintain the temperature of a spray booth, container, room or other enclosed space and to provide breathable air for a person who may be present during operation~~where a person is working including spray booths that are also used for drying coatings and auto body spray booths with an adjacent contiguous section for drying automobile coatings. A MAKE-UP AIR HEATER is not a burner used to heat an oven, dryer, heater or other unit where workers are not present during heating~~.

(14~~1~~) NOx EMISSIONS means the sum of nitrogen oxide and nitrogen dioxide in the flue gas, collectively expressed as nitrogen dioxide.

(15~~2~~) PROCESS HEATER means any equipment that is fired with gaseous and/or liquid fuels and which transfers heat from combusted fuel to water or process streams. PROCESS HEATER does not include any fryer or any furnace, kiln or oven used for melting, heat treating, annealing, drying, curing, baking, cooking, calcining, or vitrifying; any heated tank; or any unfired waste heat recovery heater that is used to recover sensible heat from the exhaust of any combustion equipment.

(16~~3~~) PROTOCOL means a South Coast Air Quality Management District approved test protocol for determining compliance with emission limits for applicable equipment.

(17~~4~~) RATED HEAT INPUT CAPACITY means the gross HEAT INPUT of the combustion UNIT specified on a permanent rating plate attached by the manufacturer to the device. If the UNIT has been altered or modified~~ such that its gross HEAT INPUT is higher or lower than the rated HEAT INPUT capacity specified on the original manufacturer's permanent rating plate~~, the new gross HEAT INPUT as specified in subparagraph (c)(12)(B) shall be considered as the rated HEAT INPUT capacity.

(18) RELOCATION means removal from one parcel of land in the District and installation on another non-contiguous parcel of land. RELOCATION does not mean a move from one parcel of land to another parcel of land where the two parcels have the same address, are under common ownership, and are separated solely by a public roadway or other public right-of-way.

(19~~5~~) REMEDIATION UNIT means a device used to capture or incinerate air toxics, VOCs or other combustible vapors extracted from soil or water.

(20~~16~~) RESPONSIBLE OFFICIAL means:

(A) For a corporation: a president or vice-president of the corporation in charge of a principal business function or a duly authorized person who performs similar policy-making functions for the corporation; or

(B) For a partnership or sole proprietorship: general partner or proprietor, respectively.

(C) For a government agency: a duly authorized person

(21~~7~~) TENTER FRAME DRYER is a cloth dryer that holds the edges of the material as it is dried in order to control shrinkage.

(22~~18~~) THERM means 100,000 BTU.

(23~~19~~) UNIT means any oven, dryer, dehydrator, heater, kiln, calciner, furnace, crematory, incinerator, heated pot, cooker, roaster, fryer, heated tank and evaporator, distillation unit, afterburner, degassing unit, vapor incinerator, catalytic or thermal oxidizer, soil or water remediation units and other combustion equipment with nitrogen oxide emissions requiring a District permit and not specifically required to comply with a NOx emission limit by other District Regulation XI rules. UNIT does not mean any solid fuel fired combustion equipment, internal combustion engine~~ subject to District Rule 1110.2~~, turbine, charbroiler, ~~or ~~boiler, water heater, thermal fluid heater~~s~~, ~~or ~~enclosed process heater, ~~subject to District Rules 1109, 1146, 1146.1, or 1146.2 or~~and other combustion equipment subject to nitrogen oxide limits of other District Regulation XI rules~~ 1111, 1112, 1117, 1118, 1121, or 1135~~.

(24~~0~~) VAPOR INCINERATOR means a furnace, afterburner, or other device for burning and destroying air toxics, VOCs or other combustible vapors in gas or aerosol form in gas streams.

(c) Requirements

(1) On or after January 1, 2010 any person owning or operating a unit subject to this rule shall not operate the unit in a manner that exceeds the applicable nitrogen oxide emission limit specified in Table 1:

(A) at the time a District permit is required

(i) for operation of a new, relocated or ~~modified ~~replacement unit, or

(ii) for a combustion system modification or combustion system replacement, or

(iii) July 1 of~~r~~ the year a unit becomes 30 years old; or,

(B) for in-use units, in accordance with the compliance schedule in Table 2~~, or at the time of a combustion modification~~.

Table 1 – NO_x Emission Limit
for Unit Heat Ratings ≥ 325,000 BTU/hour

Equipment Category(ies)	NOx Emission Limit PPM @ 3% O_2, dry or Pound/mmBtu heat input		
	Process Temperature		
Gaseous Fuel-Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F
Asphalt Manufacturing Operation	40 ppm	40 ppm	
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator [1]	~~3~~60 ppm or 0.073~~6~~ lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Burn-off Furnace, Burnout Oven, Incinerator or Crematory with or without Integrated Afterburner	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Evaporator, Fryer, Heated Process Tank, or Parts Washer	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	
Metal Heat Treating, Metal Melting Furnace, Metal Pot, or Tar Pot	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Oven, Dehydrator, Dryer, Heater, Kiln, ~~Crematory, Incinerator,~~ Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Make-Up Air Heater or other Air Heater located outside of building with temperature controlled zone inside building	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	
Tenter Frame or Fabric or Carpet Dryer	30 ppm or 0.036 lb/mmBtu		
Other Unit or Process Temperature	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Liquid Fuel-Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F
All liquid fuel-fired Units	40 ppm or 0.053 lb/mmBtu	40 ppm or 0.053 lb/mmBtu	60 ppm or 0.080 lb/mmBtu

1. Emission limit applies to burners in units fueled by 100% natural gas that are used to incinerate air toxics, VOCs, or other vapors; or to heat a unit. The emission limit applies solely when burning 100% fuel and not when the burner is incinerating air toxics, VOCs, or other vapors. The unit shall be tested or certified to meet the emission limit while fueled with natural gas.

Table 2 – Compliance Schedule for Specific In-Use Units and In-Use Units with NOx Emissions of One Pound per Day or More

Equipment Category(ies)	Submit Permit Application	Unit Shall Be in Compliance
Specific UNIT		
Remediation UNIT manufactured and installed prior to March 1, 2012~~1998~~	Seven months prior to a combustion system modification, combustion system replacement or unit replacement or a ~~change of location~~relocation.	Upon combustion system modification, combustion system replacement or unit replacement or ~~change of location~~relocation beginning March 1, 2012
Evaporator, heated process tank, or parts washer with a District permit issued and operating prior to January 1, 2014	Seven months prior to combustion system modification, combustion system replacement or unit replacement	Upon combustion system modification, combustion system replacement or unit replacement
Tar Pot		All new permit applications beginning January 1, 2013
UNIT with Emissions ≥1 Pound/Day		
Afterburner, degassing unit, catalytic oxidizer, thermal oxidizer, vapor incinerator, ~~evaporator, food oven,~~ fryer, ~~heated process tank, parts washer~~ or spray booth make-up air heater manufactured prior to 1998	December 1, 2013	July 1, 2014
Other UNIT manufactured prior to 1986	December 1, 2011	July 1, 2012
Other UNIT manufactured prior to 1992	December 1, 2011	July 1, 2012
Other UNIT manufactured prior to 1998	December 1, 2012	July 1, 2013
Any UNIT manufactured after 1997	December 1 of the year prior to the compliance date	July 1 of the year the unit is 15 years old

(2) Unit age shall be based on:

(A) The original date of manufacture as determined by:

(i) Original manufacturer's identification or rating plate permanently fixed to the equipment. If not available, then;

(ii) Invoice from manufacturer for purchase of equipment. If not available, then;

(iii) Information submitted to the ~~AQM~~District with prior permit applications for the specific unit. If not available, then;

(iv) The ~~U~~unit ~~is~~ will be deemed by the ~~AQM~~District to be 20 years old as of July 1, 2012; or

(B) The date that operations start for a tunnel kiln or crematory rebuilt prior to January 1, 2010 with new burner(s) as determined by:

(i) Production or fuel usage records after burner installation, and

(ii) Invoice for burner(s) installation. If not available, then;

(iii) Invoice for burner(s) purchase, If not available, then;

(iv) Manufacture date of burner(s) as identified by an attached manufacturers identification or rating plate or date stamp.

(3) In accordance with the schedule in the permit, owners or operators of units shall determine compliance with the emission limit specified in Table 1 using a District approved test protocol. The test protocol shall be submitted to the District at least 90 days prior to the scheduled test and approved by the District Source Testing Division.

(4) Notwithstanding the requirements of paragraph (c)(1), units with combustion system modifications or combustion system replacements completed prior to December 5, 2008 and after January 1, 2000 that resulted in replacement of more than 75% of the rated heat input capacity shall comply with the applicable emission limit specified in Table 1 of paragraph (c)(1) ten years from the date the modification was performed.

(5) The date a combustion system modification or combustion system replacement, as specified in paragraphs (c)(1) and (c)(4), is performed; shall be determined according to ~~sub~~paragraph (c)(2)~~(B), if not available, then subparagraph (c)(2)(C)~~.

(6) ~~Notwithstanding the requirements of paragraph (c)(1), a unit with a District permit to construct or permit to operate, and with emissions of one pound per day or less of nitrogen oxides, may defer compliance with the applicable emission limit specified in Table 1 of paragraph (c)(1) for up to five years from the applicable compliance date in Table 2 of (c)(1).~~ NOx emissions of less than one pound per day ~~or less~~ shall be demonstrated by compliance with one of the following requirements:

(A) A ~~unit has a~~ rated heat input capacity of less than ~~400~~325,000 Btu per hour;~~or less.~~

(B) A permit condition that limits NOx emissions to less than 1 pound per day; ~~The unit as of September 9, 2011 has a NOx permit emission limit of one pound per day or less, a permit condition with a process limit that results in one pound per day or less of NOx emissions including but not limited to fuel use, material throughput or operating schedule, or actual operations that results in one pound per day or less of NOx emissions. Daily operating records of unit fuel use or process rate and daily operating hours demonstrating that starting January 1, 2012 until the date of compliance, the unit has a maximum emission rate of 1 pound of NOx per day.~~

(C) Monthly recordkeeping of unit use documenting average emissions of less than one pound per day calculated based on a unit-specific non-resettable time meter or a non-resettable unit fuel meter with fuel use corrected to standard temperature and pressure. Owners or operators of units with installed calibrated non-resettable totalizing time or fuel meters may elect to comply with the requirements of (c)(6) by ~~requesting, no later than January 1, 2012, unit permit conditions of limits on operating hours per calendar month and/or a fuel meter and a limit on the amount of fuel use per~~ demonstrating each calendar month ~~so~~ that monthly NOx emissions are less than 22~~30~~ pounds or less. Monthly emissions with a time meter shall be calculated using the unit's maximum hourly emission rate in pounds multiplied by the hours of operation each calendar month. The maximum hourly emission rate shall be equal to the rated heat input capacity of the unit multiplied by the unit's emissions at the rated heat input capacity in pound per million Btu. Monthly emissions calculated with a fuel meter shall be equal to the unit's emission rate per unit of fuel multiplied by the amount of fuel, corrected to standard temperature and pressure, used that calendar month.

(D) Daily recordkeeping of unit operation and the following specified rated heat input capacities operating less than or equal to the specified number of hours per day in Table 3:

Table 3 – Small and Low Use Unit Daily Operating Limits

Unit Rating (Btu/hour)	Daily Hour Limit
325,000 to 400,000	16
400,001 to 500,000	14
500,001 to 800,000	8
800,001 to 1,000,000	6
1,000,001 to 1,200,000	5

(E) Daily recordkeeping of unit operation and the following specified rated heat input capacities operating less than or equal to the specified number of hours per calendar month in Table 4:

Table 4 – Small and Low Use Unit Monthly Operating Limits

Unit Rating (Btu/hour)	Monthly Hour Limit
325,000 to 400,000	352
400,001 to 500,000	308
500,001 to 800,000	176
800,001 to 1,000,000	132
1,000,001 to 1,200,000	110

(F) Unit natural gas use less than or equal to 7,692 cubic feet per day at standard temperature and pressure, documented by daily recordkeeping of gas consumption with a non-resettable fuel meter; or

(G) Daily recordkeeping of unit operation using process specific parameters that demonstrate the unit does not emit one pound per day or more of NOx emissions, does not exceed the daily and weekly hours of operation submitted for the District permit application, and complies with all unit permit conditions.

Owners or operators of units complying under this paragraph that fail to continuously demonstrate compliance with the applicable heat input rating, permit condition, or daily or monthly requirements of this paragraph shall comply with the applicable emission limit in Table 1 by the applicable compliance date in Table 2 or within 210 days from the date the unit first fails to continuously comply with heat input rating, permit condition, or the daily or monthly ~~emission~~ limit requirement whichever is later. A unit that must demonstrate compliance with an emission limit for failure to demonstrate emissions less than one pound per day pursuant to this provision shall comply with the applicable emission limit for the life of the unit.

(7) On or after January 1, 2010, any person owning or operating a unit subject to this rule shall perform combustion system maintenance in accordance with the manufacturer's schedule and specifications as identified in the manual and other written materials supplied by the manufacturer or distributor. The owner or operator shall maintain on site at the facility where the unit is being operated a copy of the manufacturer's, distributor's, installer's or maintenance company's written maintenance schedule and instructions and retain a record of the maintenance activity for a period of not less than three years. The owner or operator shall maintain on site at the facility where the unit is being operated a copy of the District certification or District approved source test reports, conducted by an independent third party, demonstrating the specific unit complies with the emission limit. The source test report(s) must identify that the source test was conducted pursuant to a District approved protocol. The model and serial numbers of the specified unit shall clearly be indicated on the source test report(s). The owner or operator shall maintain on the unit in an accessible location a permanent rating plate. The maintenance instructions, maintenance records and the source test report(s) or District certification shall be made available to the Executive Officer upon request.

(8) Any person owning or operating a unit subject to this rule complying with Table 1 using pounds per million BTU, shall install and maintain in service non-resettable, totalizing, fuel meters for each unit's fuel(s) prior to the compliance determination specified in paragraph (c)(3). Owners or operators of a unit with a combustion system that operates at only one firing rate that comply with an emission limit using pounds per million BTU shall install a non-resettable, totalizing, time or fuel meter for each fuel.

(9) Meters that require electric power to operate shall be provided a permanent supply of electric power that cannot be unplugged, switched off, or reset except by the main power supply circuit for the building and associated equipment or the unit's safety shut-off switch. Any person operating a unit subject to this rule shall not shut off electric power to a unit meter unless the unit is not operating and is shut down for maintenance or safety.

(10) On or before the compliance date, the owner or operator of a unit shall demonstrate compliance with the applicable emission limit in Table 1 pursuant to the provisions of subdivisions (d) or (e).

(11) Compliance by Certification

For units that do not allow adjustment of the fuel and combustion air for the combustion system by the owner or operator, and upon approval by the Executive Officer, an owner or operator may demonstrate compliance with the emission limit and demonstration requirement of this subdivision by certification granted to the manufacturer for any model of equipment sold for use in the District. Any unit certified pursuant to subdivision (e) shall be deemed in compliance with the emission limit in Table 1 and demonstration requirement of this subdivision, unless a District source test shows non-compliance.

(12) Identification of Units

(A) New Manufactured Units

The manufacturer shall display the model number and the rated heat input capacity of the unit complying with subdivision (c) on a permanent rating plate. The manufacturer shall also display the District certification status on the unit when applicable.

(B) Modified Units

The owner or operator of a unit with a modified combustion system (new or modified burners) shall display the new rated heat input capacity on a new permanent supplemental rating plate installed in an accessible location on the unit or burner. The gross heat input shall be based on the maximum fuel input corrected for fuel heat content, temperature and pressure. Gross heat input shall be demonstrated by a calculation based on fuel consumption recorded by an in-line fuel meter by the manufacturer or installer.

(13) The owner or operator shall maintain on site a copy of all documents identifying the unit's rated heat input capacity for as long as the unit is

retained on-site. The rated heat input capacity shall be identified by a manufacturer's or distributor's manual or invoice and a permanent rating plate attached to the unit. If a unit is modified, the rated heat input capacity shall be calculated pursuant to subparagraph (c)(12)(B). The documentation of rated heat input capacity for modified units shall include the name of the company and person modifying the unit, a description of all modifications, the dates the unit was modified and calculation of rated heat input capacity. The documentation for modified units shall be signed by the highest ranking person modifying the unit.

(14) Alternate Compliance Plans

(A) Owners or operators of facilities with three~~five~~ or more in-use units ~~with permit emissions greater than one pound per day NOx that will~~ required to demonstrate compliance with the emission limit within two consecutive calendar years~~burner modifications~~ may submit an alternate compliance plan ~~by January 1, 2012~~ to phase-in compliance of all units~~ starting April 1, 2012 and ending before January 1, 2015~~. The compliance plan shall be submitted at least 270 days prior to the date the first unit is required to demonstrate compliance. The alternate compliance plan shall identify the units included in the plan and a schedule identifying when each unit will comply with the emission limit and the compliance determination for each unit will be completed. At least one unit shall ~~be~~demonstrate compliance ~~modified to comply~~ with the applicable emission limit of this rule by the first compliance date for any unit included in the plan~~April 1, 2012~~. Each year thereafter, a minimum of 20 percent of additional units and no less than one unit shall demonstrate compliance~~be modified to comply~~ with the applicable emission limit. All units with NOx emissions greater than or equal to 1 pound per day identified in Table 2 of paragraph (c)(1) must demonstrate compliance~~y~~ with the applicable emission limit of this rule before January 1, 2015.

(15) Any unit with NOx emissions less than one pound per day that becomes 30 years old on or before July 1, 2018 shall demonstrate compliance with the applicable emission limit specified in paragraph (c)(1) on or before July 1, 2020.

~~(B) Owners or operators of facilities with pollution control unit(s) in series with process unit(s) (e.g., an oven and afterburner) that have NOx emissions greater than one pound per day and different compliance dates may elect to synchronize compliance of all units in the series on one date no later than December 1, 2013.~~

(d) Compliance Determination

(1) All compliance determinations pursuant to paragraph (c)(6) shall be calculated:

(A) Using a District approved test protocol averaged over a period of at least 15 minutes of combustion system operation and no more than 60 consecutive minutes;

(B) After unit start up; and

(C) In the unit's as-found operating condition.

(2) For ~~E~~each unit, a compliance determination shall be made in the maximum heat input range at which the unit normally operates.

(3) An additional compliance determination shall be made ~~using a heat input of less than 35% of the rated heat input capacity~~ for any of the following types of units ~~with process temperature less than 1200 °F that operate with variable heat input that falls below 50% rated heat input capacity during normal operation~~: Make-Up Air Heater, other Air Heater located outside of process building, Oven, Dehydrator, Dryer, Tenter-Frame Dryer, Fabric Dryer, Carpet Dryer, Heater, Cooker, Roaster, non-metallurgical Furnace, or Heated Storage Tank. The additional compliance determination for the specified units in this paragraph shall be made:

(A) Using a heat input of less than 35% of the rated heat input capacity; or

(B) For at least 30 consecutive minutes after unit start up using the lowest operating temperature that may be used during normal operation of the unit.

(4) For compliance determinations after the initial approved test, the operator is not required to resubmit a protocol for approval if: there is a previously approved protocol and the unit has not been altered in a manner that requires a permit alteration; and rule or permit emission limits have not become more stringent~~changed~~ since the previous test.

(~~2~~5) All parts per million emission limits specified in subdivision (c) are referenced at 3 percent volume stack gas oxygen on a dry basis.

(~~3~~6) Compliance with the NO_X emission limits of subdivision (c) and determination of stack-gas oxygen and carbon dioxide concentrations for this rule shall be determined according to the following procedures:

(A) District Source Test Method 100.1 – Instrumental Analyzer Procedures for Continuous Gaseous Emission Sampling (March 1989); or

(B) ASTM Method D6522-00 – Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers; or

(C) United States Environmental Protection Agency Conditional Test Method CTM-030 – Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Emissions from Natural Gas-Fired Engines, Boilers and Process Heaters Using Portable Analyzers; or

(D) District Source Test Method 7.1 – Determination of Nitrogen Oxide Emissions from Stationary Sources (March 1989); and

(E) District Source Test Method 10.1 – Carbon Monoxide and Carbon Dioxide by Gas Chromatograph/Non-Dispersive Infrared Detector (GC/NDIR) – Oxygen by Gas Chromatograph-Thermal Conductivity (GC/TCD) (March 1989); or

(F) Any alternative test method determined approved before the test in writing by the Executive Officers of the District, the California Air Resources Board and the United States Environmental Protection Agency.

(~~4~~7) For any operator who chooses to comply using pound per million Btu, NO_X emissions in pounds per million Btu of heat input shall be calculated using procedures in 40 CFR Part 60, Appendix A, Method 19, Sections 2 and 3.

(~~5~~8) Records of source tests shall be maintained for ten years and made available to District personnel upon request. Emissions determined to exceed any limits established by this rule through the use of any of the test methods specified in subparagraphs (d)(3)(A) through (d)(3)(F) shall constitute a violation of this rule.

(9~~6~~) All compliance determinations shall be made using an independent contractor to conduct testing, which is approved by the Executive Officer under the Laboratory Approval Program for the applicable test methods.

(10~~7~~) For equipment with two or more units in series or multiple units with a common exhaust~~ or units with one dual purpose burner that both heats the process and incinerates VOC, toxics or PM~~, the owner or operator may demonstrate compliance with the emission limits in Table 1 by one of the following:

(A) Test each unit separately and demonstrate each unit's compliance with the applicable limit, or

(B) Test only after the last unit in the series and at the end of a common exhaust for multiple units~~ or dual purpose burner~~, when all units are operating, and demonstrate that the series of units either meet:

(i) The lowest emission limit in Table 1 applicable to any of the units in series, or

(ii) A heat input weighted average of all the applicable emission limits in Table 1 using the following calculation.

$$\textbf{Weighted Limit} = \frac{\Sigma\,[\,(EL_X)*(Q_X)\,]}{\Sigma\,[\,Q_X\,]}$$

Where:

EL_X = emission limit for unit X

Q_X = total heat input for unit X during test

(11) An owner or operator of any unit with a unit heat rating of 2 million Btu per hour or less may elect to demonstrate compliance with the applicable emission limit through a burner manufacturer's performance warranty in lieu of a compliance demonstration pursuant to paragraphs (d)(1) through (d)(10) or subdivision (e) of this rule provided the following information

required in subparagraphs (d)(11)(A) through (d)(11)(C) is provided when a permit application is submitted for a unit:

(A) The manufacturer or manufacturer authorized distributor of the burner(s) submits performance warranties that are signed by the burner manufacturer's responsible official pursuant to subparagraph (b)(20)(A) of this rule, that warrants the burner(s), fuel and combustion air system, and combustion control system identified in the application for the District Permit that complies with the applicable NOx emission limit in Table 1 of paragraph (c)(1) when used for specified processes, operating conditions, and within specified temperature ranges. The signed performance warranties shall be submitted separately, and addressed to the:

(i) owner or operator of the unit; and

(ii) Executive Officer or designee.

(B) The burner manufacturer, manufacturer authorized distributor submits to the Executive Officer or designee, supporting documentation including emission test reports of at least five District approved emission tests using District approved test protocol and methods of five different units using the same burner, fuel and combustion air system, and combustion control system that demonstrate compliance with the applicable emission limit for the same type of process operating in the same temperature range as the unit in the permit application. The five emission test results submitted for the manufacturer's performance warranty must have been approved by the District prior to submittal of an application for permit.

(C) A contract or purchase order, signed by the responsible official of the unit's owner or operator pursuant to paragraph (b)(20), for purchase of the burner(s), fuel and combustion air system, and combustion control system to be installed in the unit as identified in the permit application and the signed letter or bid from the burner manufacturer to the owner or operator of the unit as specified in subparagraph (d)(11)(A) of this rule.

(D) The owner or operator of any unit where the requirements specified in subparagraphs (d)(11)(A) through (d)(11)(C) are not met or submits any manufacturer's performance warranty, contract, or purchase order that is not identical to the combustion system specified in the application for the unit's permit and installed in the unit, shall demonstrate unit compliance with the applicable emission limit in Table 1 through emission testing pursuant to the requirements of paragraphs (d)(1) through (d)(10) of this rule.

(i) The owner or operator specified above shall demonstrate unit compliance through emission testing within 210 calendar days from the date a permit is approved by the District. A unit that must demonstrate compliance with an emission limit of this paragraph and shall comply with the applicable emission limit for the life of the unit.

(E) The owner or operator of any unit that fails to operate the unit as specified in the manufacturer's performance warranty in subparagraphs (d)(11)(A) through (d)(11)(C), including specified processes, operating conditions, and temperatures, shall demonstrate compliance with the applicable emission limit in Table 1 through emission testing pursuant to the requirements of paragraphs (d)(1) through (d)(10) of this rule.

(e) Certification

(1) Unit Certification

For units that do not allow adjustment of the fuel and combustion air for the combustion system by the owner or operator, any manufacturer or distributor that distributes for sale or sells units or burner systems for use in the District may elect to apply to the Executive Officer to certify such units or burner systems as compliant with subdivision (c).

(2) Manufacturer Confirmation of Emissions

Any manufacturer's application to the Executive Officer to certify a model of equipment as compliant with the emission limit and demonstration requirement of subdivision (c) shall obtain confirmation from an independent contractor that is approved by the Executive Officer under the Laboratory Approval Program for the necessary test methods prior to applying for certification that each unit model complies with the applicable requirements of subdivision (c). This confirmation shall be based upon District approved emission tests of standard model units and a District approved protocol shall be adhered to during the confirmation testing of all units subject to this rule. Emission testing shall comply with the requirements of paragraphs (d)(1) through (d)(5) except emission determinations shall be made at 100% rated heat input capacity and an additional emission determination shall be made using a heat input of less than 35% of the rated heat input capacity for any Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer, Vapor Incinerator, Make-Up Air Heater, other Air Heater located outside of process building, Oven, Dehydrator, Dryer, Tenter-Frame Dryer, Fabric Dryer, Carpet Dryer, Heater, Kiln, Crematory, Incinerator, Calciner, Cooker, Roaster, non-metallurgical Furnace, or Heated Storage Tank.

(3) When applying for unit(s) certification, the manufacturer shall submit to the Executive Officer the following:

(A) A statement that the model is in compliance with subdivision (c). The statement shall be signed and dated by the manufacturer's responsible official and shall attest to the accuracy of all statements;

(B) General Information

(i) Name and address of manufacturer,

(ii) Brand name, if applicable,

(iii) Model number, as it appears on the unit rating plate; and

(iv) Rated Heat Input Capacity, gross output of burner(s) and number of burners;

(C) A description of each model being certified; and

(D) A source test report verifying compliance with the applicable emission limit in subdivision (c) for each model to be certified. The source test report shall be prepared by the confirming independent contractor and shall contain all of the elements identified in the District approved Protocol for each unit tested. The source test shall have been conducted no more than ninety (90) days prior to the date of submittal to the Executive Officer.

(4) When applying for unit certification, the manufacturer shall submit the information identified in paragraph (e)(3) no more than ninety (90) days after the date of the source test identified in subparagraph (e)(3)(D) and at

least 120 days prior to the date of the proposed sale and installation of any District certified unit.

(5) The Executive Officer shall certify a unit model which complies with the provisions of subdivision (c) and of paragraphs (e)(2), (e)(3), and (e)(4).

(6) Certification status shall be valid for five years from the date of approval by the Executive Officer. After the fifth year, recertification shall be required by the Executive Officer according to the requirements of paragraphs (e)(2), (e)(3), and (e)(4).

(f) Enforcement

(1) The Executive Officer may inspect certification records and unit installation, operation, maintenance, repair, combustion system modification, combustion system repair, combustion system replacement, unit replacement, relocation and test records of owners, operators, manufacturers, distributors, retailers, and installers of units located in the District, and conduct such tests as are deemed necessary to ensure compliance with this rule. Tests shall include emission determinations, as specified in paragraph (d)(1) to (d)(10~~4~~), of a random sample of any category of units subject to this rule.

(2) An emission determination specified under paragraph (f)(1) that finds NOx emissions in excess of those allowed by this rule or permit conditions shall constitute a violation of this rule.

(g) Exemptions

(1) The provisions of this rule shall not apply to units:

(A) subject to the nitrogen oxide limits of other District Regulation XI rules~~ 1109, 1110.2, 1111, 1112, 1117, 1121, 1134, 1135, 1146, 1146.1, or 1146.2~~; or

(B) located at RECLAIM facilities.

(2) The provisions of this rule shall not apply to charbroilers or food ovens.

(3) The provisions of this rule shall not apply to:

(A) Flares subject to District Rule 1118;

(B) Flares, afterburners, degassing units, thermal or catalytic oxidizers or vapor incinerators in which a fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gas, is used only to maintain a pilot for vapor ignition or is used for five minutes or less to bring a unit up to operating temperature;

(C) Municipal solid waste incinerators with a District permit operating before December 5, 2008;

(D) An afterburner or vapor incinerator with a District permit operating before December 5, 2008 that has an integrated thermal fluid heat exchanger that captures heat from the afterburner or vapor incinerator and an oven or furnace exhaust in order to reduce fuel consumption by an oven or the afterburner or vapor incinerator; or

(E) A flare, afterburner, degassing unit, remediation unit, thermal oxidizer, catalytic oxidizer or vapor incinerator process in which ~~a fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gas, is mixed with~~particulate matter, air toxics, VOCs, landfill gas, digester gas or other combustible vapors are mixed in the unit's burner with combustion air or fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gas, prior to or at incineration in the unit, in order to maintain vapor concentration above the upper explosion limit or above a manufacturer specified limit in order to maintain combustion or temperature in the unit. This exemption does not apply to a regenerative thermal or catalytic oxidizer unit with a burner ~~with a separate fuel line~~ used to heat up or maintain temperature of the~~a~~ unit or a unit that incinerates particulate matter, air toxics, VOCs or other combustible vapors in a gas stream moving past the burner flame.

(4) Afterburners, degassing units, thermal oxidizers, catalytic oxidizers, vapor incinerators, and spray booth make-up air heaters installed and operating before March 1, 2012 and with emissions less than one pound per day, are exempt from the emission limit in Table 1 until the unit is 30 years old or undergoes a combustion system modification, combustion system replacement, or relocation or the unit is replaced. ~~New a~~Afterburners, degassing units, thermal oxidizers, catalytic oxidizers, vapor incinerators, and spray booth make-up air heaters installed for use at a specific facility after December 5, 2008 and before March 1, 2012 and with emissions of one pound per day or more, ~~are exempt from~~shall comply with the

emission limit in Table 1 ~~until~~on and after July 1 of the year the unit is 15 years old.

(5) ~~New or relocated r~~Remediation units installed after December 5, 2008 and before March 1, 2012, are exempt from the emission limit in Table 1 until replacement with a new unit, a combustion system modification, combustion system replacement, or ~~change of location~~relocation on or after January 1, 2012.

(6) Fryers installed and operating before January 1, 2014 and with emissions less than one pound per day, are exempt from the emission limit in Table 1 until the unit is 30 years old, a combustion system modification, combustion system replacement, relocation, or the unit is replaced. ~~New food ovens, f~~Fryers~~, heated process tanks, parts washers, and evaporators~~ installed after December 5, 2008 and operating before January 1, 2014 and with emissions of one pound per day or more, are exempt from the emission limit in Table 1 until July 1 of the year the unit is 15 years old.

(7) Remediation units are exempt from the applicable emission limit in Table 1 while fueled with propane, butane or liquefied petroleum gas in a location where natural gas is not available. Remediation units must comply with the emission limit when natural gas is available and while fueled with natural gas.

(8) The provisions of paragraphs (c)(1) and (c)(3) of this rule shall not apply to any evaporator, heated process tank, or parts washer with a District permit issued and operating prior to January 1, 2014 until a combustion system modification, combustion system replacement, relocation, or the unit is replaced.

(9) The provisions of paragraph (c)(3) of this rule shall not apply to units heated solely with infrared burners.

(10) On and after (date of adoption) the provisions of paragraphs (c)(1) and (c)(3) of this rule shall not apply to any unit that becomes subject to this rule subsequent to a revision of District Rule 219, on or after May 5, 2017, until the unit is replaced. a combustion system modification, combustion system replacement, unit relocation, the applicable compliance date in Table 2 of paragraph (c)(1), or, for units with NOx emissions less than one pound per day, the unit becomes 30 years old.

(11) The requirement to demonstrate compliance with an emission limit in Table 1 shall not apply to any in-use unit with emissions less than one

pound per day NOx at the time the unit is relocated with the facility to the new facility location and the facility and unit is owned and operated by the same company and owner(s) for 36 calendar months prior to and 36 calendar months after the unit relocation. This exemption from demonstrating compliance with an emission limit at the time of a unit and facility relocation does not apply if the relocated unit is replaced, undergoes a combustion system modification or combustion system replacement, subject to a compliance date in Table 2 of paragraph (c)(1), or, for units with NOx emissions less than one pound per day and not subject to paragraph (g)(8), the unit becomes 30 years old.

(h) Technology Assessment

(1) On or before December 7, 2015, the Executive Officer shall conduct a technology assessment and shall report to the Governing Board on the availability of burner systems and units for processes with NOx emissions of one pound per day or less.

(i) Mitigation Fee Compliance Option

(1) An owner or operator of a unit with emissions of ~~more than~~ 1 pound per day or more may elect to delay the applicable compliance date in Table 2 of paragraph (c)(1) or (c)(4) three years by submitting an alternate compliance plan and paying an emissions mitigation fee to the District in lieu of meeting the applicable NOx emission limit in Table 1.

(2) Compliance Demonstration

An owner or operator of a unit electing to comply with the mitigation fee compliance option shall:

(A) Submit an alternate compliance plan and pay the mitigation fee to the Executive Officer at least 150 days prior to the applicable compliance date in Table 2 of paragraph (c)(1) or (c)(4), and

(B) Maintain on-site a copy of verification of mitigation fee payment and ~~AQM~~District approval of the alternate compliance plan that shall be made available upon request to ~~AQM~~District staff.

(3) Plan Submittal

The alternate compliance plan submitted pursuant to paragraphs (i)(1) and (i)(2) shall include:

(A) A completed ~~AQM~~District Form 400A with company name, ~~AQM~~District Facility ID, identification that application is for a compliance plan (section 7 of form), and identification that request is for the Rule 1147 mitigation fee compliance option (section 9 of form);

(B) Attached documentation of unit fuel use for previous 5 years, description of weekly operating schedule, unit permit ID, unit heat rating (Btu/hour), and fee calculation;

(C) Filing fee payment; and

(D) Mitigation fee payment as calculated by Equation 1.

Equation 1:

$$MF = R \text{ X } (3 \text{ years}) \text{ X } (L_1 - L_0) \text{ X } (AF) \text{ X } (k)$$

Where,

MF = Mitigation fee, \$

R = Fee Rate = \$12.50 per pound (\$6.25 per pound for a small business with 10 or fewer employees and gross annual receipts of \$500,000 or less)

L_1 = Default NOx emission factor, 0.136 lbs of NOx/mmBtu for natural gas and LPG, and 0.160 lb/mmBtu for fuel oils

L_0 = Applicable NOx emission limit specified in Table 1 in lbs/mmBtu

AF = Annual average fuel usage of unit for previous 5 years, mmscf/yr for natural gas or gallons for liquid fuel

k = unit conversion for cubic feet of natural gas to Btu = 1,050 Btu/scf, 95,500 Btu/gallon for LPG, and 138,700 Btu/gallon for fuel oil

ATTACHMENT G

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Final Staff Report
Proposed Rule 1147 – NOx Reductions from Miscellaneous Sources

June 2017

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EXECUTIVE SUMMARY

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Proposed Amended Rule 1147 (PAR 1147) is intended to provide relief to businesses and other regulated operations by extending compliance dates for small and low emission units and providing other flexibility that will reduce implementation costs and facilitate compliance. In addition, PAR 1147 clarifies exemptions and other requirements and will benefit the regulated community. PAR 1147 will result in delayed emissions reductions but will achieve most of the NOx reductions as the current SIP approved rule.

Rule 1147 was adopted on December 5, 2008 and is a vital component of the attainment strategy to meet the federal PM2.5 ambient air quality standards by 2014 as well as meet the ozone standards. Rule 1147 is based on two control measures from the 2007 Air Quality Management Plan (AQMP): NOx reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MSC-01). Rule 1147 established nitrogen oxide (NOx) emission limits for a wide variety of combustion equipment and affects both new and existing (in-use) combustion equipment.

Under Rule 1147, equipment requiring SCAQMD permits that are not regulated by other NOx rules must meet an emission limit of 30 or 60 parts per million (ppm) of NOx depending upon equipment type and process temperature. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of existing equipment are provided at least 15 years of use before they must meet rule emission limits and the first units that must meet the emission limits are 25 to 50 years old. Specific categories of newer units have later compliance dates. Smaller and low emission units currently get five more years to comply with emission limits than larger units. These small sources are not subject to rule emission limits until they are at least 20 years old. These units are required to demonstrate compliance with rule emission limits starting July 1, 2017.

Rule 1147 also established test methods and provides alternate compliance options including a process for certification of equipment NOx emissions through an SCAQMD approved testing program. Certification eliminates the requirement for end-users to test their equipment. Other rule requirements include equipment maintenance and recordkeeping.

Rule 1147 was amended September 9, 2011 to delay implementation dates one to two years, remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. In addition, the rule amendment added a requirement for an assessment of rule impacts on small sources through an updated evaluation of technologies and cost for retrofitting small and low emission sources (less than one pound per day NOx) that are not typically subject to the best available control technology (BACT) requirement as new sources.

SCAQMD staff is proposing to amend Rule 1147 to incorporate stakeholders' technical concerns, recommendations made in a technology assessment for small sources, and provide compliance options for issues that have been raised by stakeholders. The key elements of the proposed amendment are as follows:

- Remove the requirement to comply with an emission limit for units with a heat input rating of less than 325,000 Btu/hour [Table 1, (c)(1)]. These units would still be subject to maintenance and recordkeeping requirements;
- Change the NOx emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm [Table 1, (c)(1)];
- Change the compliance date for small in-use units (with NOx emissions of less than one pound per day) from a schedule based on a 20 year lifetime to a 30 year lifetime or when the units are replaced or retrofit [(c)(1) and (c)(6)];
- Change the compliance date for existing in-use heated process tanks and pressure washers from a schedule based on a 15 to 20 year lifetime to when the units are replaced or retrofit. These units would not be required to comply with an emission limit at any specific age and may be relocated with a facility move [(g)(8) and (g)(11)];
- Add a testing exemption for ultra-low NOx infrared burners [(g)(9)];
- Provide compliance flexibility for low emission units by clarifying options for demonstrating emissions less than one pound per day [(c)(6)];
- Add an exemption for units with emission less than 1 pound per day when a company relocates a facility and remains under the same ownership [(g)(11)];
- Add an exemption for units that become subject to the rule upon amendment of Rule 219 [(g)(10)];
- Add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee [(d)(1) – (d)(11)];
- Clarify an exemption for food ovens [(a), (g)(1), and (g)(2)]; and
- Clarify an exemption for flare type systems [(g)(3)(E)].

The proposed amendment adds and clarifies a number of exemptions for a variety of equipment categories. An exemption from the requirement to comply with the emission limit at 30 years of age is proposed for heated process tanks and conveyorized pressure washer systems because it is difficult to retrofit existing units without replacing the whole unit. An exemption from complying with an emission limit is proposed for low emission units (less than 1 pound per day) that are relocated because an entire facility is relocated. This relocation exemption for these small and low emission units is available when the facility owner and company remain the same for 36 months before and 36 months after the facility is moved. An exemption is also proposed for units that become subject to the rule upon amendment of SCAQMD Rule 219. A testing exemption for infrared burners is being proposed because these systems have NOx emission much less than 30 ppm. The proposed amendment also completes the exemption of food ovens from Rule 1147 and clarifies an exemption for flare based incineration systems which cannot be retrofit with different combustion systems.

If implemented, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day in 2017. However, most of the emission reductions foregone will be recaptured starting in 2017 because the existing units will be regularly replaced and upgraded over time. Staff estimates that less than 0.05 ton/day of NOx emissions will be permanently foregone because of the proposed changes to emission limits and exemptions including units 325,000 Btu or smaller, heated process tanks and spray washers, and the proposed changes to emission limits. This is about 5 percent of the 0.9 ton per day forgone due to delay of compliance dates.

CHAPTER 1: BACKGROUND

INTRODUCTION

The California Health and Safety Code requires the SCAQMD to adopt an Air Quality Management Plan (AQMP) to meet state and federal ambient air quality standards and adopt rules and regulations that carry out the objectives of the AQMP. The California Health and Safety Code also requires the SCAQMD to implement all feasible measures to reduce air pollution.

SCAQMD Rule 1147 was adopted December 2008 to seek reductions from NOx emission equipment not regulated by other SCAMD rules and, because of the number and variety of equipment affected, the rule compliance schedule was phased in over 10 years. The NOx reductions from Rule 1147 are a vital component of our attainment strategy and essential for achieving compliance with federal and state ambient air quality standards for PM2.5, PM10, and ozone.

REGULATORY HISTORY

Rule 1147 – NOx Reductions from Miscellaneous Sources, was adopted by the SCAQMD Governing Board on December 5, 2008. Rule 1147 incorporates two control measures of the 2007 Air Quality Management Plan (AQMP): NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MSC-01).

Control measure MCS-01 proposed that equipment operators meet best available control technology (BACT) emission limits at the end of the equipment's useful life. Control measure CMB-01 proposed emission NOx limits in the range of 20 ppm to 60 ppm (referenced to 3% oxygen) for ovens, dryers, kilns, furnaces and other miscellaneous combustion equipment. Emission reductions from the equipment addressed by Rule 1147 and control measure CMB-01 of the 2007 AQMP were proposed in prior AQMPs (e.g., Control Measure CMB-02 from the 1997 AQMP).

Rule 1147 established nitrogen oxide (NOx) emission limits for a wide variety of combustion equipment and affects both new and existing (in-use) combustion equipment. Rule 1147 requires equipment with SCAQMD permits that are not regulated by other NOx rules to meet an emission limit of 30 to 60 parts per million (ppm) of NOx depending upon equipment type and process temperature. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of existing equipment are provided at least 15 years of use before they must meet rule emission limits. Specific categories of newer units have later compliance dates. The first units required to comply with the emission limits were 20 to 50 years old. In addition, small sources are provided five more years to comply with emission limits when they are at least 20 years old. The owners of small units and units with emissions of less than one pound per day have later compliance dates starting in July 1, 2017.

Rule 1147 also established test methods and provides alternate compliance options including a process for certification of equipment NOx emissions through an SCAQMD and EPA approved testing program. Other rule requirements include equipment maintenance and recordkeeping.

Rule 1147 was amended September 9, 2011 to delay implementation dates one to two years, and remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. In addition, the rule amendment added a requirement for an assessment of rule impacts on small sources through an updated evaluation of technologies and cost for retrofitting small and low emission sources that are not typically subject to the best available control technology (BACT) requirement as new sources.

A draft technology assessment was made available to the public in January 2016. Since the release of the draft technology assessment, staff met with stakeholders at a Rule 1147 Task Force meeting in February 2016, selected a contractor to review the technology assessment with the input of stakeholders, arranged for the reviewer to meet with stakeholders at two Rule 1147 Task Force meetings, and SCAQMD staff completed the technology assessment. A Draft Technology Assessment was submitted to the Governing Board at the March 4, 2016 meeting. The Technology Assessment was reviewed by a third party contractor selected by a panel that included stakeholders. The third party reviewer also received comments from stakeholders and completed their review in October 2016. After additional input from stakeholders, the Technology Assessment was finalized in February 2017 and provided with the preliminary draft rule amendment and staff report for the Public Workshop on February 15, 2017.

The proposed amended rule is based on the recommendations of the technology assessment and independent third party review. In addition, the proposed amendment includes recommendations and requests from stakeholders that were made during development, after publication of the technology assessment, and during the rule development process.

AFFECTED INDUSTRIES

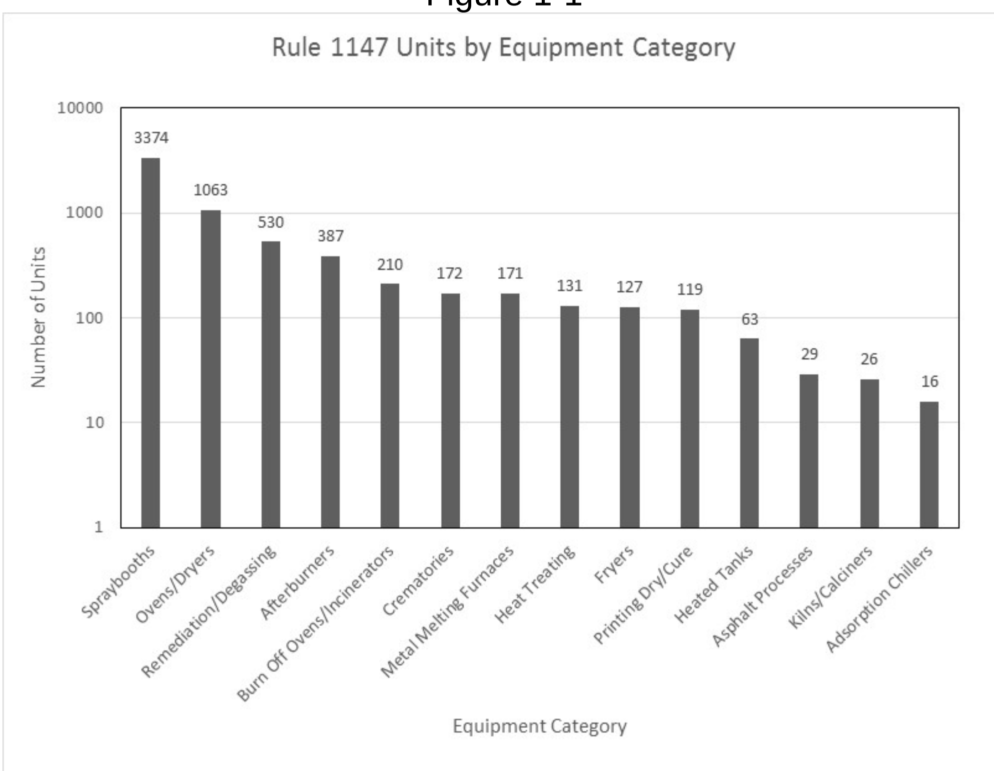
A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, food products preparation, printing, textile processing, product coating; and material processing. A large fraction of the equipment subject to Rule 1147 heats air that is then directed to a process chamber and transfers heat to process materials. Other processes heat materials directly such kilns, process tanks and metallurgical furnaces.

Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the District (NAICS 21, 23, 31-33, 42, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92). The units affected by the rule are used in industrial, commercial and institutional settings for a wide variety of processes. Some examples of the processes regulated by the rule include metal casting and forging, coating and curing operations, asphalt manufacturing, baking and printing.

Staff originally estimated approximately 6,600 units subject to the emission limits of Rule 1147 are located at approximately 3,000 facilities. Staff estimated that about 1,600 units at about 800 facilities affected meet the NOx emission limits of Rule1147. This leaves about 2,200 facilities that are expected to require retrofit of burners in their equipment. Staff estimated as many as 2,500 permitted units with NOx emission limits one pound per day or more and an additional 2,500 permitted units with NOx emission limits of less than one pound per day will require modifications to comply with the emission limits.

Based on an update of the active permitted equipment in the SCAQMD, an estimate of the number of equipment potentially subject to Rule 1147 and the fraction of units in different categories is presented in Figure 1-1. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

Figure 1-1



The second largest category of equipment is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the Figure 1-1.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with high temperature processes (metal melting, heat treating, burn off ovens, kilns and crematories) being the next largest group with approximately 700 units in these five categories. Although these categories have fewer equipment, many units have significantly higher emissions than spray booths and small ovens. The technology assessment included in Appendix B provides a more detailed summary of the industries and equipment categories affected by Rule 1147.

Based on permitted emissions and information provided by manufacturers, vendors and businesses, staff has calculated an emissions inventory of 3.0 to 5.2 tons of NOx per day from the equipment regulated by Rule 1147. Spray booths (≈ 3,400 units) contribute about 0.5 to 0.6 tons per day. Other types of equipment with permit limits of less one pound per day (≈ 1,500 units) have NOx emissions totaling about 0.4 tons per day. Equipment with a potential to emit of one pound per day or more (≈ 1,500 units) contribute NOx emissions of 2.1 to 4.2 tons per day. These emission estimates are consistent with the 6.2 tons per day emission estimate developed from the 2007 AQMP for adoption of Rule 1147 in 2008.

It should be noted that the AQMP inventory was based on fuel use and default emission factors. The 2007 AQMP inventory did not take into account lower emissions from units that met BACT emission limits. Using the midpoint of the estimated range from the above calculation for larger sources gives a total inventory estimate for all equipment of about 4.1 tons of NOx per day. This estimate is consistent with the AQMP inventory and permit information that at least one quarter of the units have burners that can comply with BACT and Rule 1147 emission limits.

In addition, staff estimates that as many as half of the units (750 out of 1,500) with a potential to emit one pound per day or more may have actual daily NOx emissions less than a pound per day. Many of these units with actual emissions less than one pound per day have BACT and Rule 1147 compliant burners that significantly reduce their emissions. If this estimate is correct, then more than half of units with emissions of one pound per day or more of NOx (about 375) have already submitted test protocols and test results. Moreover, because of the Rule 1147 compliance schedule, the remaining half of the 750 units with emission of one pound per day or more have been permitted since the late 1990s and installed burners that comply with BACT and Rule 1147 NOx emission limits.

PUBLIC PROCESS

The proposed changes to Rule 1147 are a product of a multiyear effort to assess low NOx technology and cost-effectiveness of retrofitting small and low emission affected by Rule 1147. Since the September 2011 amendment of Rule 1147, staff has met with representatives from affected businesses, equipment vendors, manufacturers, trade organizations, and other interested parties. Including the rule development efforts to adopt SCAQMD Rule 1153.1 in 2014, amend Rule 219 in 2013 and the technology assessment, staff has held two or more task force meetings every year since 2012.

During the development of the technology assessment staff visited several printing businesses, food manufacturing facilities, and a local manufacturer of ovens and burn-off furnaces. In 2016, staff held three meetings of the Rule 1147 Task Force in order to receive additional input on the draft technology assessment with the last meeting on November 8, 2016. Recently, staff has also met with and visited local businesses including a manufacturer of conveyorized pressure washers, a metal finishing company, and a large printing company to observe operations and equipment affected by Rule 1147. For this current proposed amendment, Rule 1147 Task Force meetings were held on January 17 and April 20, 2017. A Public Workshop and CEQA scoping meeting for PAR 1147 was held on February 15, 2017.

CHAPTER 2: SUMMARY OF PROPOSED RULE 1147

PROPOSED AMENDED RULE REQUIREMENTS

SCAQMD staff is proposing to amend Rule 1147 to reflect the recommendations made in the Rule 1147 Technology Assessment for Small and Low Emission Sources and the third party review of the technology assessment. In addition, staff proposes to provide additional compliance options for issues that have been raised by stakeholders. The key elements of the proposed amendment are as follows:

- Remove the requirement to comply with an emission limit for units with a heat input rating of less than 325,000 Btu/hour [(c)(1)]. These units would still be subject to maintenance and recordkeeping requirements to minimize emissions;
- Change the NOx emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm [Table 1, (c)(1)];
- Change the compliance date for small in-use units (with NOx emissions of less than one pound per day) from a schedule based on a 20 year lifetime to a 30 year lifetime or when the units are replaced or retrofit [(c)(1) and (c)(6)];
- Change the compliance date for existing heated process tanks and pressure washers from a schedule based on a 15 to 20 year lifetime to when the units are replaced or retrofit. These units are not required to comply with an emission limit at any specific age and may be relocated with a facility move [(g)(8) and (g)(11)];
- Add a testing exemption for ultra-low NOx infrared burners [(g)(9)];
- Provide compliance flexibility for low emission units by clarifying options for demonstrating emissions less than one pound per day [(c)(6)];
- Add an exemption for units with emission less than 1 pound per day when a company relocates a facility and remains under the same ownership [(g)(11)];
- Add an exemption for units that become subject to the rule upon amendment of Rule 219 [(g)(10)];
- Add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee [(d)(1) – (d)(11)];
- Clarify an exemption for food ovens [(a), (g)(1), and (g)(2)]; and
- Clarify an exemption for flare type systems [(g)(3)(E)].

The proposed rule amendment provides relief to affected businesses by delaying compliance dates for existing in-use small and low emission units. For units with emissions less than one pound per day of NOx, compliance dates are extended by 10 years to when a unit is 30 years old. However, most units would be replaced, have the heating system modified or replaced, or sold to another facility or as scrap before they become 30 years old. When a unit is sold, replaced, or modified it would be required to comply with emission limits at that time.

Equipment categories with new unit compliance dates after January 1, 2010 also benefit from this 10 year extension from 20 to 30 years of age. These categories include spray booths, fryers and afterburners, degassing units, thermal oxidizers, catalytic oxidizers, vapor incinerators, and other equipment used for similar processes. However, heated process tanks, evaporators and conveyorized pressure washer systems would have an additional delay and would not be required to comply with an emission limit at 30 years of age.

NOX EMISSION LIMIT CHANGES

The proposed amendment will raise the NOx emission limit for low temperature (less than 800 °F) afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm. This recommendation from the technology assessment is due to the emission characteristics of the preferred burner technology used in these incineration processes. In addition, the proposed amendment removes the emission limit for units with heat ratings of 325,000 Btu per hour or less. While these units would not be subject to emission limits under the proposed amendment, they would still be subject to the maintenance requirements in the rule. In addition, new units are potential subject to BACT requirements of new source review (SCAQMD Regulation XIII).

EXEMPTIONS

The proposed rule adds and clarifies a number of exemptions for a variety of equipment categories. An exemption from the 30 years compliance date is proposed for heated process tanks and conveyorized pressure washer systems because it is difficult to retrofit existing units without replacing the whole unit. A testing exemption for infrared burners is being proposed because these systems have NOx emission much less than 30 ppm. An exemption from complying with an emission limit is being proposed for low emission units (less than 1 pound per day) that are relocated because an entire facility is relocated. This relocation exemption for these small and low emission units is available when the facility owner and company remain same for 36 months before and 36 months after the facility is moved. An exemption is also proposed for units that become subject to the rule upon amendment of SCAQMD Rule 219 which defines when equipment require an SCAQMD permit. The proposed amendment also completes the exemption of food ovens from Rule 1147 and clarifies an exemption from the rule for flare based incineration systems which cannot be retrofit with different combustion systems.

OPTIONS FOR DEMONSTRATING UNIT EMISSIONS

The proposed amendment will provide additional flexibility and reduce cost to affected businesses. PAR 1147 clarifies options for businesses to identify equipment with emissions of less than one pound per day that are eligible for later compliance that are available in the current rule and provides additional detail on those options. Equipment eligible for a later compliance date pursuant to paragraph (c)(6) can be identified through either daily or monthly recordkeeping or permit conditions with process limitations that result in emissions of less than one pound per day.

A variety of permit conditions have been used by SCAQMD to identify equipment that is not subject to BACT or offsets because they have emissions of less than one pound per day. SCAQMD has used operating limits with time or fuel meters or equipment rating to identify equipment with emissions of less than one pound per day. However, other permit conditions are also used and the following list only provides a summary of some of the types of conditions found in SCAQMD permits:

- The unit rated heat capacity specified on the permit.
- A condition in the permit with a process limit resulting in less than one pound per day of NOx emissions including but not limited to fuel use, material throughput or operating schedule. A person owning or operating a unit subject to this type of condition maintains records of unit fuel use, material throughput, operating hours or other relevant process activity.
- A permit condition limiting the number of operating hours per day or month and recordkeeping. Emissions are calculated as the unit's maximum hourly emission rate in pounds multiplied by hours of operation. The maximum hourly emission rate is equal to the rated heat input capacity of the unit multiplied by the unit's emissions at the rated heat input capacity.
- A permit condition limiting daily or monthly fuel use and recordkeeping. Emissions are calculated as the process emission rate per unit of fuel multiplied by the amount of fuel used.

PAR 1147 identifies a variety of options for units to demonstrate emissions less than one pound per day of NOx. An owner or operator of a unit may choose to add a time or fuel meter to assist recordkeeping for a unit. Addition of a meter does not require a permit modification. However, the owner/operator may request such a modification to the permit and install a time or fuel meter to help demonstrate that emissions are less than one pound per day. In addition, the owner/operator may use monthly recordkeeping to demonstrate less than a pound per day emissions if they have installed a meter.

OPTIONS FOR COMPLIANCE WITH EMISSION LIMITS

The proposed rule provides additional testing options that are not present in the current rule. One new option for testing ovens, dryers, and other low temperature applications will provide flexibility for testing of these unit across the operating range of the combustion system in these units. The additional testing option is for when the unit is warmed up, burners are not firing at their maximum rate, and are cycling on and off or are modulating to adjust and maintain the temperature in the unit. The owner/operator and their contractor has the test the unit while the combustion system modulates or cycles on and off at the lowest set temperature for any process for which the unit is used. Emissions are averaged over the time the burners are firing to heat the unit. If the burner(s) cycle on and off, then the times the burner(s) do not fire are excluded from the calculation of average emissions. Alternatively, owner/operators may use the existing option of testing the unit when the combustion system operates at less than 35 percent of its maximum firing rate.

A second option proposed for units with heat rating of 2 million Btu per hour and lower is to allow the use of a burner manufacturer's performance guarantee. To be eligible for this compliance option, the following information would be required to be submitted to the SCAQMD as part of a permit application:

- A signed letter or bid from the burner manufacturer or authorized distributor to the owner of operator of the unit that guarantees NOx emissions of the proposed combustion system will comply with the applicable emission limit for specified processes, operating conditions, and process temperatures,
- At least five District approved missions tests of same the burner used in the same type of process and operating in the same temperature range proposed for the unit,
- A signed contract or purchase order from the owner or operator of the unit to the burner manufacturer or authorized distributor for the purchase of the combustion system identified in the manufacturers performance guarantee, and
- A signed letter from the burner manufacturer or authorized distributor to the District that guarantees NOx emissions of the proposed combustion system will comply with the applicable emission limit for specified processes, operating conditions, and process temperatures.

These items must be submitted with a permit application. In addition, the combustion system description in the guarantees and contract or purchase order must be identical to the combustion system proposed to be installed in the permit applications and installed in the unit. All required documentation must be provided at the time of an application for a District permit. The emission test results submitted to support the manufacturer guarantee must have been approved by the SCAQMD prior to submittal of the permit application. If all required documentation is not included with the permit application, the District will issue the permit with a requirement that the owner or operator will demonstrate compliance with the emission limit through emissions testing by a specified date as required in subdivisions (c) and (d) of the rule. Any delay in providing required documentation for the manufacturer's performance guarantee by the owner or operator, manufacturer or authorized representative, or owner or operators contractor will not delay the review and approval of the permit by the District and the permit will be issued with a permit requirement to demonstrate compliance with the emission limit through emissions testing by a specified date as required in subdivisions (c) and (d) of the rule.

RELOCATION EXEMPTION FOR LOW EMISSION UNITS

The proposed rule amendment includes an exemption for units with emission less than one pound per day that are moved to a new location because the entire facility was relocated. This exemption would allow an owner or to move a low emission unit with the relocated facility to a different location or consolidate one entire facility with another when both facilities are part of the same company under the same ownership. These small units would still be subject to other requirements in the rule that would trigger compliance with emission limits including but not limited to: applicable compliance dates including unit age, when the unit is replaced, and at the time of a combustion system modification and combustion system replacement. This relocation exemption is not applicable to the transfer or sale of a unit or facility to a different company, owner, or operator. This relocation exemption is not applicable to the purchase or other acquisition of a unit for installation in a different location.

CHAPTER 3: IMPACT ASSESSMENT

IMPACT ANALYSIS

COST EFFECTIVENESS

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

SOCIOECONOMIC IMPACT ASSESSMENT

INCREMENTAL COST EFFECTIVENESS

COMPARATIVE ANALYSIS

PUBLIC COMMENTS

IMPACT ANALYSIS

If implemented, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 tons per day in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. At an average replacement rate of 4% per year, this would result in recovery of the emissions forgone in 25 years. Staff estimates that 4,900 to 5,650 out of 6,400 units are affected by these proposed changes.

NOx emission reductions foregone from equipment subject to Rule 1147 can be estimated using information on typical use provided by operators visited by SCAQMD staff and potential to emit (PTE) for affected units in SCAQMD records. Based on natural gas consumptions, business owners and equipment vendors indicate typical automotive booths and other booth operations at maintenance facilities, businesses that repair non-automotive equipment, and other specialty shops have emissions of less than one third pound (0.3 pound) NOx each day they operate. However, many booths have greater emissions because they are used for manufacturing operations or can have more than one shift per day. Up to 200 booths used in manufacturing and other large coating applications may have emissions exceeding a pound per day. In addition, while many auto body shops do not paint cars every day during the week, larger operations can operate two shifts per day.

Based on this information, the 3,400 permitted booths and spray stations are estimated to have emissions of about 0.5 ton NOx per day (= [3,400 units X approximately 0.3 pound NOx/day per all booth types]/[2000 pounds/ton]). About 1,500 other types of combustion equipment including, but not limited to, ovens, dryers, and furnaces also have PTE of less than one pound of NOx per day. Because there is a wide distribution of PTE estimated for these other types of equipment, average emissions from each of these units is assumed to be 0.5 pound of NOx per day for a total of 0.4 ton NOx per day from these 1,500 units (= [1,500 units X 0.5 pound NOx/day]/[2,000 pounds/ton]). An additional 750 units with a PTE of one pound of NOx per day or greater may have actual emissions less than one pound of NOx per day. The estimated emissions from these 750 units is about 0.3 ton NOx per day (= [750 units X 0.8 pound NOx/day]/[2,000 pounds/ton]).

Based on this approach, the approximately 4,900 to 5,650 units that may benefit from PAR 1147 and that have emissions of less than one pound of NOx per day are estimated to emit about 0.9 to 1.2 tons of NOx per day. The majority of equipment with emissions less than one pound of NOx per day are subject to a 30 ppm NOx emission limit which would reduce emissions by about 71 percent. However, a much smaller number of equipment that would be subject to a 60 ppm NOx limit and the emission reductions would be about 41 percent. Assuming a 66 percent reduction for the combination of equipment emission reductions of 41 percent to 71 percent, for the 4,900 to 5,650 units, the overall NOx emission reductions foregone is expected to range between approximately 0.6 (excluding the 750 other units that might have emissions less than 1 pound per day) to 0.9 ton per day. Staff estimates that less than 0.05 ton/day of NOx emissions will be permanently forgone because of the proposed changes to emission limits and exemptions. This is about 5 percent of the 0.9 ton per day forgone due to delay of compliance dates. Thus, PAR 1147 will result in significant adverse air quality impacts. However, with the exception of about 0.05 ton/day, these emission reductions foregone will be made up as new rule compliant equipment replaces existing units.

COST EFFECTIVENESS

PAR 1147 will change the schedule for full implementation of the rule and provide other compliance flexibilities including making some emission limits less stringent. There is no additional cost for this proposed amendment and a cost effectiveness analysis is not applicable. The proposed changes to the requirements of PAR 1147 are designed to address issues related to technical feasibility and reduce cost to affected businesses.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA) ANALYSIS

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq.*, requires environmental impacts of proposed projects to be evaluated and feasible methods to reduce, avoid or eliminate significant adverse impacts of these projects to be identified and implemented. The lead agency is the "public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment" (Public Resources Code § 21067). Since the SCAQMD has the primary responsibility for supervising or approving the entire project as a whole, which is a proposed SCAQMD rule, it is the most appropriate public agency to act as lead agency (CEQA Guidelines[1] § 15051(b)).

The currently proposed amendments to Rule 1147 (PAR 1147) are considered to be modifications to a previously approved project (the adoption of Rule 1147 on December 5, 2008 and the amendments to Rule 1147 on September 9, 2011) and are ~~PAR 1147 is~~ considered to be a "project" as defined by CEQA. CEQA requires that all potential adverse environmental impacts of proposed projects be evaluated and that methods to reduce or avoid identified significant adverse environmental impacts of these projects be implemented if feasible. The purpose of the CEQA process is to inform the SCAQMD Governing Board, public agencies, and interested parties of potential adverse environmental impacts that could result from implementing the proposed project and to identify feasible mitigation measures or alternatives, when an impact is significant.

Public Resources Code Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written documents in lieu of an environmental impact report once the secretary of the resources agency has certified the regulatory program. The SCAQMD's regulatory program was certified by the secretary of resources agency on March 1, 1989, and has been adopted as SCAQMD Rule 110 – Rule Adoption Procedures

[1] The CEQA Guidelines are codified at Title 14 California Code of Regulations § 15000 *et seq.*

to Assure Protection and Enhancement of the Environment. Pursuant to Rule 110 (the rule which implements the SCAQMD's certified regulatory program), SCAQMD prepared a Notice of Preparation/Initial Study (NOP/IS) which identified environmental topics to be analyzed in a Draft Environmental Assessment (EA). The NOP/IS provided information about the proposed project to other public agencies and interested parties prior to the intended release of the Draft EA. The NOP/IS was distributed to responsible agencies and interested parties for a 30-day review and comment period from February 1, 2017, to March 3, 2017. The initial evaluation in the NOP/IS identified the topic of operational air quality as potentially having potentially significant adverse impacts requiring further review. During the public comment period, the SCAQMD received two comment letters relative to the NOP/IS.

Following the release of the NOP/IS, further analysis of the proposed project indicated that the type of CEQA document appropriate for the proposed project is a Subsequent Environmental Assessment (SEA), in lieu of an EA. The SEA is a substitute CEQA document, prepared in lieu of a Subsequent EIR (CEQA Guidelines § 15162(b)), pursuant to the SCAQMD's Certified Regulatory Program (CEQA Guidelines § 15251(l); codified in SCAQMD Rule 110). Therefore, a SEA is appropriate because new information of substantial importance, which was not known and could not have been known at the time the Final EA was certified for the adoption of Rule 1147 in December 2008 (referred to herein at the December 2008 Final EA) and the Final Subsequent EA that was certified for the amendments to Rule 1147 in September 2011 (referred to herein as the September 2011 Final SEA), became available (CEQA Guidelines § 15162(a)(3)). Further, PAR 1147 is expected to have significant effects that were not discussed in the previous December 2008 Final EA or September 2011 Final SEA (CEQA Guidelines § 15162(a)(3)(A)). In the event that new information becomes available that would change a project, the lead agency shall prepare a subsequent Environmental Impact Report (EIR) (CEQA Guidelines § 15162(b)). However, under SCAQMD's certified regulatory program, an equivalent document, a subsequent EA, can be a substitute for preparing a subsequent EIR.

The SEA is also a public disclosure document intended to: 1) provide the lead agency, responsible agencies, decision makers and the general public with information on the environmental impacts of the proposed project; and 2) be used as a tool by decision makers to facilitate decision making on the proposed project.

Thus, the SCAQMD, as lead agency for the proposed project, prepared a Draft SEA pursuant to its Certified Regulatory Program. The Draft SEA identified and analyzed the topic of operational air quality as the only area that may have significant adverse impacts if the proposed project is implemented because PAR 1147 is expected to result on NOx emission reductions foregone of up to 0.9 tons per day in 2017. The Draft SEA concluded that only the topic of operational air quality emission impacts would have significant adverse impacts. Because PAR 1147 may have statewide, regional or areawide significance, a CEQA scoping meeting was required for the proposed project pursuant to Public Resources Code § 21083.9(a)(2) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017. Further, pursuant to CEQA Guidelines § 15252, since significant adverse impacts were identified, an alternatives analysis and mitigation measures are required and are included in the SEA.

The Draft SEA was released for a 46-day public review and comment period from March 24, 2017 to May 9, 2017 and ~~one~~two comment letters ~~was~~were received. None of the comments in ~~this~~these letters identified other potentially significant adverse impacts from the proposed project. The comments made at the CEQA scoping meeting and the responses to these comments are included in Appendix D of the Final~~Draft~~ SEA. The comment letters received relative to the NOP/IS and the responses to the comments are included in Appendix E of the Final~~Draft~~ SEA. In addition, the~~all~~ comment~~s~~ letter received during the public comment period on the analysis presented in the Draft SEA has~~will~~ been responded to and is included in an appendix to the Final SEA (see Final SEA Appendix F).

Since the release of the Draft SEA, minor modifications were made to PAR 1147 and some of the revisions were made in response to verbal and written comments on the project's effects. Staff has reviewed the modifications to PAR 1147 and concluded that none of the modifications constitute significant new information or a substantial increase in the severity of an environmental impact, nor provide new information of substantial importance relative to the draft document. In addition, revisions to PAR 1147 in response to verbal or written comments would not create new, avoidable significant effects. As a result, these minor revisions do not require recirculation of the Draft SEA pursuant to CEQA Guidelines § 15088.5. Thus, the Draft SEA has been revised to reflect the aforementioned modifications and to include the comment letters and responses to comments such that it is now a Final SEA.

The previously certified December 2008 Final EA, September 2011 Final SEA, supporting documentation, and record of approval of the December 2008 adoption and the September 2011 amendments are available upon request by calling the SCAQMD Public Information Center at (909) 396-2677 or by visiting SCAQMD's website at www.aqmd.gov. The direct link to the December 2008 Final EA can be found at: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2008/final-environmental-assessment-for-proposed-rule-1147.pdf. The direct link to the September 2011 Final SEA can be found at: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2011/final-subsequent-environmental-assessment-for-proposed-amended-rule-1147.pdf. Also, as part of certifying the September 2011 Final SEA, the Governing Board adopted Findings, a Statement of Overriding Considerations, and Mitigation Monitoring Plan (referred to as Attachment 1 to the Governing Board Resolution for the September 2011 Final SEA) and the direct link to this document can be found at: http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2011/attachment-1-to-the-governing-board-resolution-for-par-1147.pdf.

Prior to making a decision on the adoption of PAR 1147, the SCAQMD Governing Board must review and certify the Final SEA, including responses to comments, as providing adequate information on the potential adverse environmental impacts that may occur as a result of adopting PAR 1147.

SOCIOECONOMIC IMPACT ASSESSMENT

PAR 1147, if adopted, would 1) exempt units rated less than 325,000 Btu per hour from an emission limit; 2) make emission limits less stringent for low temperature afterburners, burn-off ovens, incinerators, and related equipment; 3) extend the compliance schedule for small and low emission existing in-use units (i.e., with NOx emissions of less than one pound per day) and all existing in-use heated process tanks and pressure washers; ~~2) make emission limits less stringent for equipment in certain specified categories;~~ ~~3~~4) ~~allow owners of~~ exempt small and low emission existing in-use ~~low emission~~ units ~~to relocate a unit without requiring the unit to demonstrate compliance with~~ from the rule emission limit when ~~the unit is moved during~~ a company relocates an entire facility ~~relocation~~; and ~~4~~5) exempt any unit that becomes subject to the rule upon amendment of Rule 219 on or after May 5, 2017 until the unit is replaced, modified or must comply with a compliance date in Table 2 of the rule or becomes 30 years old. ~~increase the age limit from 20 to 30 years for required compliance demonstration among all equipment with NOx emissions less than one pound per day.~~ These proposed amendments are based on technical feasibility considerations that were validated through a technology assessment and intended to provide flexibility that would delay and/or reduce implementation costs to affected businesses and facilitate compliance. PAR 1147 would additionally add a test exemption for ultra-low NOx direct-fired infrared burners that would reduce compliance cost. Moreover, owners or operators of units with a unit heat rating of 2 million Btu/hour or less would be provided with the option to submit with its permit application a burner manufacturer's performance guarantee in lieu of the emission testing requirement. This option could further reduce compliance cost for these owners or operators. The remaining amendments, proposed to clarify exemptions and other requirements, would benefit the regulated community in general but would have few cost impacts as they are administrative in nature.

The units regulated by Rule 1147 that potentially may be affected by the proposed amendments are used in a wide variety of industries, as discussed in the "Affected Industries" section of this staff report. As PAR 1147 is expected to result in delayed and reduced compliance costs, there would be no adverse regional economic impacts as a result of the proposed amendments.

There are four CEQA alternatives to the proposed amendments. Alternative A is the No Project Alternative where the proposed amendments would not be adopted. Alternative B considers a more stringent age requirement for compliance demonstration (25 years) than the proposed amendments but still less stringent than the existing rule. At the same time, it does not provide a relocation exemption and is thus as stringent as the existing rule in this regard. However, it considers additionally requiring compliance with emission limits when multiple similar process units at a facility have combined NOx emissions greater than one pound per day—a requirement more stringent than the existing rule. Alternative C considers a less stringent age requirement (none) than both the proposed amendments and the existing rule. It also considers exempting all pressure washers from complying with any emission limit, which is less stringent than the proposed amendments or existing rule. Similar to Alternative C, Alternative D considers no age requirement for compliance demonstration and compliance exemption for all pressure washers; moreover, it also considers exempting all units with NOx emissions less than one pound per day[2] (demonstrated through recordkeeping), making it the least stringent CEQA alternative of all.

Therefore, compared to the existing rule, PAR 1147 and CEQA Alternatives C and D are expected to result in delayed (due to less stringent compliance schedule) and avoided (due to additional exemptions) incurrence of compliance cost and overall cost-savings. CEQA Alternative A would not result in any cost impact as it maintains the status quo. CEQA Alternative B would delay the compliance schedule by up to five years due to its less stringent age requirement than what is in the existing rule, thereby resulting in maximally five years of compliance cost avoided. ~~However, additional compliance cost is also expected, as~~ In the meantime, Alternative B considers an additional compliance requirement for facilities with combined NOx emissions greater than one pound per day from multiple similar process units. Therefore, some compliance costs could potentially occur sooner than in the proposed project and offset some of the avoided compliance costs related to the proposed delayed compliance schedule. However, based on the profiles of currently permitted equipment, this additional requirement as considered in Alternative B would be potentially applicable to only a small number of facilities, if any. Therefore, it is expected that, on the net,~~In the case where a large number of facilities would be subject to this requirement,~~ Alternative B ~~could potentially~~would not result in additional compliance costs beyond what is expected to be incurred by the affected facilities for compliance with current rule requirements and the proposed project.

~~DRAFT FINDINGS UNDER CALIFORNIA HEALTH AND SAFETY CODE SECTION 40727~~

~~California Health and Safety Code Section 40727 requires that prior to adopting, amending or repealing a rule or regulation, the SCAQMD Governing Board shall make findings of necessity, authority, clarity, consistency, non-duplication, and reference based on relevant information presented at the public hearing and in the staff report. In order to determine compliance with Sections 40727, 40727.2 require a written analysis comparing the proposed amended rule with existing regulations.~~

[2] Overall, under Alternative D, exemptions would apply to low emission units whose emissions limits would be changed under the proposed project, heated tanks and pressure washers, and units rated less than ~~or equal to~~ 325,000 Btu/hour.

~~The following provides the draft findings.~~

~~**Necessity**: A need exists to amend Rule 1147 to provide additional time to implement the technology to meet the NOx emission limits.~~

~~**Authority**: The SCAQMD obtains its authority to adopt, amend, or repeal rules and regulations from California Health and Safety Code Sections 39002, 40000, 40001, 40440, 40440.1, 40702, 40725 through 40728, 41508, and 41700.~~

~~**Clarity**: PAR 1147 has been written or displayed so that its meaning can be easily understood by the persons affected by the rule.~~

~~**Consistency**: PAR 1147, which was approved into the State Implementation Plan on December 28, 2016, is in harmony with, and not in conflict with or contradictory to, existing federal or state statutes, court decisions or federal regulations.~~

~~**Non-Duplication**: PAR 1147 does not impose the same requirement as any existing state or federal regulation, and is necessary and proper to execute the powers and duties granted to, and imposed upon the SCAQMD.~~

~~**Reference**: In amending this rule, the following statues which the SCAQMD hereby implements, interprets or makes specific are referenced: Health and Safety Code sections 39002, 40001, 40702, 40440(a), and 40725 through 40728.5.~~

INCREMENTAL COST-EFFECTIVENESS

Health and Safety Code Section 40920.6 requires an incremental cost-effectiveness analysis for Best Available Retrofit Control Technology (BARCT) rules or emission reduction strategies when there is more than one control option that would achieve the emission reduction objective of the proposed amendments, relative to ozone, CO, SOx, NOx, and their precursors.

The only option for reducing NOx emission from equipment affected by PAR 1147 is the use of low NOx burners. While units are available that use electricity or boilers to provide heat, these equipment are either not regulated by the SCAQMD (electric ovens and furnaces) or are regulated by other SCAQMD rules (e.g., Rules 1146, 1146.1 and 1146.2). In addition, because PAR 1147 does not impose more stringent emission limits or other requirements, this provision does not apply to the proposed amendment.

COMPARATIVE ANALYSIS

Under Health and Safety Code Section 40727.2, the SCAQMD is required to perform a comparative written analysis when adopting, amending, or repealing a rule or regulation that has the potential to impose, a new emissions limit, or other air pollution control requirements. The comparative analysis is relative to existing federal or state requirements, existing or proposed SCAQMD rules and air pollution control requirements and guidelines that are applicable to industrial, institutional, and commercial combustion equipment.

The SCAQMD is not aware of any state or federal requirements regulating air pollution that are applicable to new or in-use PAR 1147 units. Because there are no state or federal requirements for PAR 1147 units, the proposed amendments are not in conflict with and do not duplicate any SCAQMD, state or federal requirement. In addition, the proposed amendment does not impose new requirements and this provision does not apply to the proposed amendment.

PUBLIC COMMENTS

Comments on the preliminary draft rule were provided by stakeholders at the February 15, 2016 public workshop and by email before publication of the draft proposed rule and staff report. Copies of the written comments received after the public workshop and after publication of the draft proposed rule are provided in Appendix A. Comments received in writing or at the public workshop and SCAQMD staffs' response are summarized below.

Comments Received in Writing after the Public Workshop

Comment Letter #1: Request the SCAQMD amend Rule 1147 as proposed in the preliminary draft rule to allow existing small incinerators and crematories with emission less than one pound per day NOx to continue to operate without having to demonstrate that they meet the rule emission limit. Alternatively have a different (higher) emission limit for units fired on propane.

Response: Proposed Amended Rule (PAR) 1147 will delay compliance dates for small and low emission units until they are rebuilt, replaced or reach an age of 30 years. This proposed amendment will provide equipment owners 10 additional years beyond the compliance date in the current rule. In addition, the proposed rule will raise the emission limit for lower temperature incineration processes to 60 ppm NOx which will benefit a variety of equipment and operations. These two changes in PAR 1147 will provide relief to owners of small units and provide SCAQMD the opportunity to collect additional emission data on propane fired processes that can help determine if propane fired units should be regulated separately.

Comment Letter #2: Support the amendment of Rule 1147 to complete the removal of food ovens and coffee roasters from the rule. However, there is uncertainty regarding future requirements for coffee roasters because Rule 1153.1 has not been amended to regulate new units. There are different roaster configurations and the SCAQMD does not address these differences in other SCAQMD rules (Rule 1153.1, Regulation XIII (new source review and BACT) and the proposed amendment to Rule 1147.

Response: SCAQMD appreciates the commenter's support for the proposed rule amendment that will complete the removal of food ovens, including coffee roasters, from Rule 1147. However, let it be noted that SCAQMD rules (Regulation XIII – new source review and BACT, Rule 1153.1 and Rule 1147) do address differences in configurations of roasters, their burners and associated afterburners. Rule 1153.1 provides a testing exemption for direct fired infrared burners which are known to have low emissions (less than 30 ppm) and are used in new and many old coffee roasters. Rule 1153.1 emission limits are different than those in Rule 1147 and are based on different temperature ranges. While Rule 1147 regulates afterburners used to reduce emissions of VOCs, particulate and odors from coffee roasters, food ovens, and many other types of equipment, Rule 1153.1 allows owners of coffee roasters with afterburners to test the roaster oven and associated afterburner separately or together. In addition, for new source review and BACT under Regulation XIII, the SCAQMD has consistently treated unfired (indirect-fired) boilers, ovens, and other units differently than direct fired units. Indirect-fired equipment use heat recovered from fuel fired boilers, engines, ovens, flares, incinerators or afterburners. Under NSR and BACT, the emission limits for systems with heat recovery are the appropriate limit applied to the fuel fired process from where the heat is recovered (e.g., turbine, engine, boiler, or afterburner) and are not based on the type of unfired unit that uses the recovered heat (e.g., boiler, dryer, oven, fryer or roaster).

Comments Made During the Public Workshop

Comment: Commend addition of a relocation exemption, but want to discuss this issue further. Also not sure what the difference is between modification and rebuilding. This proposal does not respond to the discussion in the last Stationary Source Committee meeting regarding equipment with one pound per day of emissions and Rule 222. This issue has been brought up previously and it was proposed that small sources should be transferred from the permit program to registration with recordkeeping. The rule is a financial burden on businesses in the District and should exempt most of the equipment subject to the emission limits.

Response: The preliminary proposal presented for amending Rule 1147 is the first step and the public workshop is an opportunity for all parties to provide input in the form of comments on the initial proposal, suggested changes to the proposal or alternative proposals for amending the rule. The proposal before you was presented to the public prior to the recent discussions at the Stationary Source Committee meeting. In addition, there is a separate parallel process that is evaluating and proposing amendments to Rules 222 and 219. The technology assessment for small units affected by Rule 1147 and the recommendations in that assessment from stakeholders, SCAQMD staff and the third party review are included in the proposed changes to the rule. The proposed amendment provides relief to businesses that operated small and low emission units affected by the rule. This proposed rule amendment is a relaxation and provides financial relief to affected businesses. However, this proposal delays significant emission reductions and the SCAQMD will have to address this proposed delay of emission reductions in the State Implementation Plan (SIP) for meeting ambient air quality standards.

Comment: The printing industry supports the proposal to allow owners of equipment with emissions of less than one pound per day to move the equipment without requiring compliance with the Rule 1147 emission limit. In some industries routine maintenance includes replacing worn out components. What do you mean by the term rebuilding and what type of rebuilding would trigger the requirement to comply with the emission limit? Would rebuilding only trigger the requirement to comply with the emission limit after a specified number of years?

Response: SCAQMD staff has made commitments to revise the rule to provide owners of existing small and low emission units the opportunity to move their facility without having to immediately comply with the emission limit at the new location. However, it should be noted that new source review (NSR) under SCAQMD Regulation XIII has its own requirements and the proposed revision of Rule 1147 will not affect the requirements of that program. The proposed criteria for triggering compliance with the emission limit is focused on the replacement of units and rebuilding of a combustion system and associated components. SCAQMD staff will revise rule language to clarify the criteria.

Comment: Rule 1147 requires afterburners and other emission control devices to meet an emission limit of 60 ppm. However, BACT under new source review can require an emission limit of 30 ppm. Which emission limit must be met for a new application?

Response: Both emission requirements must be met by new units and that means a new unit must comply with the more stringent limit. Rule 1147 regulates new units but the focus is on existing older units. Therefore, the emission limit may not be as stringent as an emission limit for some types of new systems. New source review and BACT under Regulation XIII often have a more stringent emission requirement than rules that focus on existing equipment. This has been the case for boilers, process heaters, turbines, and engines in addition to equipment regulated under Rule 1147.

Comment: An oven with two burners and two exhaust stacks was tested and the unit did not pass the test. Each burner had emission less than 30 ppm. The oven should be allowed to operate.

Response: If the test was submitted to SCAQMD for review, it may be that there are issues with the test method or documentation of the test. If it has not been submitted for review, the testing company should provide the reasons for the unit not passing. Please discuss this case with SCAQMD staff so they can determine what issues must be resolved so that the unit would be allowed to operate.

Comment: What is the basis of the emission reductions foregone in the CEQA analysis? Two sections of the CEQA document related to air quality seem to contradict. Specifically the sections on emission reductions foregone and whether there is an impact on air quality. Would adding a permit condition to limit a unit's NOx emissions to less than one pound per day be an administrative change for a reduced fee?

Response: The explanation of the emission reductions foregone are in the Rule 1147 Technology assessment and are now discussed in the Draft Environmental Assessment for the proposed rule amendment and the rule amendment draft staff report. The two sections of the CEQA document in question are not contradictory. There are two related components of the CEQA notice of preparation (NOP) and initial study (IS). One component is whether the proposed project will adversely affect air quality? The other components is whether the emission reductions committed to in the air quality management plan (AQMP) will be achieved? The previous AQMP contained a mechanism to allow technology forcing rules to be amended without compromising the total reductions commitment in the plan (a set aside). The SCAQMD will have to address the emission reductions foregone from the proposed amendment relative to the newly adopted AQMP~~ and achieve those reductions in another way~~. With regard to fees charged for adding a permit condition, it is recommended that the commenter discuss a specific application with the SCAQMD Engineering and Permitting staff. Such fees are very much application specific.

Comment: Request that small ovens rated 400,000 Btu per hour and less be allowed to operate 24 hours per day and be exempt from the emission limit. Also request that alternative ways of demonstrating compliance such as the facility gas bill be allowed.

Response: The proposed amendment to rule 1147 changes emission requirements based on technical feasibility (the availability of burners that can meet the emission limits). Low NOx burners are available that achieve 30 ppm in low temperature applications at sizes of 400,000 Btu per hour and greater. Burners that can achieve 60 ppm are available in all sizes for all applications. The proposed amendment would also eliminate the emission limit requirement for small ovens with burners rated less than or equal to 325,000 Btu per hour, although other requirements of the rule will apply.

The current rule and the proposed rule amendment allow the use of a time meter on the combustions system or the facility gas bill to demonstrate emission are less than one pound per day. Under the current rule and the proposed amended rule, existing in-use units rated 400,000 Btu/hour and many larger units will be able to operate 24 hours per day producing emissions less than one pound per day. The reason small units will not exceed the one pound per day threshold is the burner does not operate 100% of the time the unit is operating or it does not operate at maximum capacity all of the time. The proposed amendment lists a screening criteria of 16 hours a day of burner operation

(Table 3 in proposed amended Rule 1147) for units rated 325,000 to 400,000 Btu per hour. Depending upon the process, temperature, and operating cycle of the burner, units larger than 400,000 Btu per hour are also able to operate 24 hours per day without exceeding one pound per day of NOx emissions because their burners do no fire all of time after a unit reaches its set temperature. For the low cost heating system (e.g., comfort air heaters used in small dryers and ovens) some businesses use, a burner cycles between on and off and fires only a portion of the time a unit is on (i.e., 30% to 70%). In the future, SCAQMD incentive programs and adoption of Proposed Rule 1111.1 for commercial space heating furnaces will make available these type of units that will meet the Rule 1147 emission limit.

Comment: Request that parts washers be exempt from the rule or have an emission limit of 100 ppm NOx.

Response: The proposed amendment exempts existing in-use parts washers from the requirement to comply with an emission limit of 60 ppm because it is not technically feasible to replace the combustion system without replacing the whole unit. However, based on test results of new parts washers, it is technically feasible for new units to comply with the emission limit. In addition, there is more than one type of burner system that can comply with the limit. For that reason, staff's proposal requires only new units to demonstrate compliance with the NOx emission limit.

Comment: The SCAQMD has required auto body repair businesses to change their operation many times to comply with changing requirements. The SCAQMD forced the auto body repair industry to change to low VOC coatings which require the use of heaters to dry coatings if the booth is used for more than a few cars a day. Emissions from a booth are very low and not measurable. A business should be able relocate a facility and continue to use its old booths at the new location without having to meet a NOx emission limit. The cost to retrofit a unit is about $40,000. The SCAQMD should provide incentives to auto body businesses to modernize their equipment.

Response: The proposed rule amendment reduces requirements compared to the current rule and provides businesses additional time to comply with emission limits. The proposed amendment also allows owners of existing facilities to relocate their low emission units (less than one pound per day) with the facility to the new location without having to comply with the emission limit. The price quoted by the commenter for a new low NOx heating system for a spray booth is consistent with the prices vendors have provided to SCAQMD staff and used in the Rule 1147 technology assessment. Part of the cost for a rule compliant heating system is due to newer building code, fire code, and insurance requirements (i.e., UL and related standards). The SCAQMD Air Quality Management Plan (AQMP) does include incentive based measures for businesses to upgrade equipment and reduce emissions.

Comment: Metal finishing operations use heaters rated 400,000 Btu per hour for small dryers and ovens. Request that small ovens and dryers of this size be allowed to operate 24 hours per day or exempt them because they have low emissions.

Response: The proposed amendment requires new units rated 400,000 Btu per hour to comply with the emission limit because compliant burner systems in this size are available for low temperature operations. For existing in-use small heaters, both the proposed rule amendment and the current rule allow units of this size and greater to operate 24 hours per day because burners typically do not fire all of the time when an oven reaches the set temperature. The proposed amended rule includes tables to more clearly state screening criteria that can be used for identifying units with emissions less than one pound per day. The proposed amendment lists a screening criteria of 16 hours a day of burner operation (Table 3 in proposed amended Rule 1147) for units rated 325,000 to 400,000 Btu per hour. The burner is not likely to be on 100% of the time an oven is operating so the oven can operate 24 hours a day while the burners is on for less than 16 hours per day. Depending upon the process, temperature, and operating cycle of the burner, units larger than 400,000 Btu per hour are also able to operate 24 hours per day without exceeding one pound per day of NOx emissions. In addition, the proposed amendment provides options to use monthly averaging and fuel usage. The SCAQMD has proposed incentive programs in the 2016 Air Quality Management Plan. In addition, adoption of Proposed Rule 1111.1 for commercial space heating furnaces will make available heating units of this size that will meet the Rule 1147 NOx limit.

Comment: One cannot use a low NOx burner for processes that operate at 300 °F and lower unless you also install a higher cost burner control system. Because of this limitation, electric ovens are used. Emissions also increase at the low operating range of low NOx burners.

Response: Because the cost effectiveness for retrofitting small units can be higher than the cost effectiveness criteria used for minor source BACT, the proposed amendment provides these units time to reach the end of their useful life before the unit is replaced (30 years). The cost effectiveness for new units is much lower. Specific categories of new units including fryers, spray booths, and afterburners and incinerators did not have to comply with emission limit as new units starting in 2010, have later compliance dates but would have to comply with emission limits when they are 30 years old.

The proposed amendment would also allow small ovens to use burners rated 325,000 Btu per hour without having to meet the 30 ppm emission limit. Electric ovens are a viable alternative for many processes. Another option is infrared burners that are used in many applications and do not require emissions testing under the proposed amendment. With the possible exception of infrared burners, the operating characteristics of both rule compliant and non-compliant burners are similar and is the reason the rule requires emission testing across the range of oven operation.

Comments Received in Writing after Release of the Draft Rule and Staff Report

Comment Letter #3: This comment letter repeats the comments from Letter #1 received previously. Request the SCAQMD amend Rule 1147 as proposed in the preliminary draft rule to allow existing small incinerators and crematories with emission less than one pound per day NOx to continue to operate without having to demonstrate that they meet the rule emission limit. Alternatively have a different (higher) emission limit for units fired on propane.

Response: Please refer to response for Comment #1.

Comment #4: A comment letter was received from FDI, Inc. that focused on the Draft Subsequent Environmental Assessment (DSEA) for PAR 1147. The letter is comment letter #1 for the DSEA but comment letter #4 for this staff report. Comments in the letter relative to the proposed rule are summarized and a response is provided below:

Comment #4-1: FDI presents the following: the emission factors listed in Table 3-1 on page 3-2 of the DSEA is flawed; the emission factors in the table and the default emission factor that SCAQMD uses overstates the baseline emissions inventory and rule emission reductions; staff should provide details on the equipment, operating temperatures, and testing of those units that resulted in the baseline emissions in the table:

- There is no record of most of this inventory in the SCAQMD annual emission reporting system;

- Auto repair spray booths have low emissions and provides estimates of emissions with calculations. An attachment includes a table of other equipment and estimates of their emissions. FDI further states that Potential to Emit (PTE) should not be used in SCAQMD analyses;

- Within the DSEA there are a significant number of devices with emissions greater than 1 pound per day and that this incorrect. FDI references an attached table of emission estimates for different types of equipment; and

- The SCAQMD should use annual emission reporting system data to generate the emission inventory and estimate emission reductions.

Response: The baseline emissions shown in Table 3-1 of the DSEA are not based on the emission factors listed in the table. Table 3-1 originates from the Environmental Assessment (EA) for Rule 1147 adoption in 2008. Because the current CEQA analysis is a Subsequent Environmental Assessment, information from the EA for rule adoption in 2008, including Table 3-1, is necessary to complete the analysis. The total emissions presented in the table for is from the 2007 Air Quality Management Plan and are based on information generated by local gas utilities which are then provided to the California Public Utilities Commission and Energy Commission. This information is then provided to the California Air Resources Board (ARB) who, along with SCAQMD inventory data, uses this information to prepare an emission inventory. The emission inventory is then provided to the SCAQMD. The emission factors listed in Table 3-1 are from U.S. EPA and presented in the table only to illustrate the range of emissions from these type of equipment. The emission estimates for the different categories are prorated based on the estimate of the number of equipment in each category. This information was previously communicated to FDI and other stakeholders during rule development for the 2008 rule adoption and the 2011 rule amendment.

FDI states that there are only a few units with emission greater than one pound per day. SCAQMD staff agree that most equipment affected by the rule have emissions less than one pound per day. This staff report indicates that at least 75% of affected units have emissions less than one pound per day and that number could be as high as 90%. However, as a group, these units generate a significant amount of emissions. Consequently, emission reductions are needed to achieve compliance with the ambient air quality standards for ozone and NOx.

While it is true there are other sources information of emissions including the SCAQMD annual emission reporting, it is not always possible to use these other sources. As noted by the commenter, few businesses are required to report under the annual emissions reporting program. In addition, most of the information collected is aggregated and it is not possible to identify individual equipment fuel use and emissions. The analysis for any rule development project estimates average and range of emissions based on appropriate emission factors that represent average emissions from different categories of equipment as well as estimates of hours of operation and usage. Some equipment will have lower emissions but other equipment will have above average emissions. The proposed amended rule staff report and Subsequent Environmental Assessment do not use Potential to Emit (PTE) to estimate emissions. However, this information can be adjusted to estimate actual emissions and is available for many equipment.

It is not possible for AQMD staff to evaluate the table of emissions estimates provided as an attachment to this letter. The fuel usage, emission factors or emission test results, and PTE as calculated for the SCAQMD permit are not provided. In addition, the weekly, daily, and hourly operation schedules are not provided. Daily emission estimates from annual data can vary significantly depending upon the actual operating schedule and other factors. For example, dividing annual emissions by 365 days per year when a unit operates 250 days per year or less will significantly underestimate daily emissions. Staff has estimated that a typical spray automobile repair spray booth has emission less than 0.3 pounds per day for an average one shift per day operation. However, some units process many more cars per day in one shift than others and some units are used for more than one shift per day. Emissions also vary depending upon the type of booth. In addition, new booths are more efficient, but there are many older booths in the SCAQMD which will have higher emissions.

The estimate of emission reductions forgone for the proposed rule amendment is 0.6 to 0.9 tons per day of NOx which will be made up over time as new units replace old units. For the CEQA impact analysis, it is necessary to estimate worst case impacts where there is uncertainty regarding the impact of project and alternatives.

Comment #4-2: FDI states that Rule 1147 does not decrease PM2.5 emissions and Low NOx burners do not emit less PM2.5

Response: PM2.5 is both directly emitted and chemically produced from its precursors which are nitrogen oxides, sulfuric oxides and volatile organic compounds. Research in atmospheric chemistry and EPA guidelines clearly define that NOx is a PM2.5 precursor. PM2.5 monitoring and modeling is required to be chemical specific (EPA, 2014) for demonstration of attainment in the AQMP and State Implementation Plan (SIP). The chemical components defined include nitrate, sulfate, organic carbon, elemental carbon, ammonia, crustal components, salt, and others. In the South Coast Air Basin, the majority of ambient PM2.5 are produced by chemical reactions from NOx, SOx and reactive organic materials. Reductions in NOx emissions from any source result in reductions of PM2.5 ambient concentrations.

Ref: U.S. EPA, 2014, Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2s, and Regional Haze.

Comment #4-3: FDI recommend CEQA Alternative D because it is consistent with BACT.

Response: Staff appreciate the comment.

Comment #4-4: The CEQA document does not address cost effectiveness and provides a summary of cost effectiveness estimates made by FDI.

Response: Cost effectiveness is addressed in the proposed amended rule Staff Report and socioeconomic analysis. PAR 1147 would be less costly than the existing rule. It should be noted that stakeholders agreed that the Technology Assessment's cost and cost effectiveness analysis for small units (< 1 lb/day) should result in exemptions and compliance delays.

FDI has previously stated that the rule cost-effectiveness is high. These same comments have been responded to in the 2011 rule amendment staff report, the Rule 1147 Technology Assessment and this staff report. Stakeholder input on cost for larger units (> 1 lb/day) was at times consistent with staff's estimates when sufficient detail was provided by the stakeholder. However, comments with examples of cost effectiveness that were significantly higher could not be verified by SCAQMD staff. In these examples the basis and details of costs provided by stakeholders were not transparent and staff and the independent reviewer of the Rule 1147 Technology Assessment could not complete evaluation of the information provided. Cost effectiveness analyses provided by stakeholders were not always consistent with permitted equipment operating hours, permit requirements, and recommendations from the ABT review of District cost analyses (i.e., a 2014 third party review of SCAQMD cost analyses). In addition, rebates from utilities for rebuilt units were excluded from cost information provided by stakeholders.

Comment #4-5: The proposed project and alternatives B, C and D will have less impact than stated in the CEQA document.

Response: Please refer to the response to comment #4-1. It should be noted that each of these alternatives result in a different amount of emission reductions forgone. Please refer the discussions of alternatives in the SEA.

Comment #4-6: Alternatives B, C, and D will have the same impacts.

Response: It should be noted that each of these alternatives result in a different amount of emission reductions forgone. Please refer the discussions of alternatives in the SEA and the response to comment #4-1.

Comment #4-7: FDI recommends that a combination of alternatives C and D should be the basis of the rule amendment. FDI also states that the emission reductions foregone are much smaller than staff's estimates and that changes to the RECLAIM program will result in sufficient reductions to offset emissions reductions foregone from amending Rule 1147. Staff should not use PTE to estimate emissions or as the basis to require a unit to comply with emission limits.

Response: Alternatives B and C are CEQA alternatives that achieve nearly the same emission reductions over time as the current rule and proposed amendment. Alternative D is not a valid CEQA alternative because it does not achieve the same objective as the proposed project. It is not a delay of emission reductions, the future emission reductions from all less than one pound per day sources would be foregone.

Please refer to the response to comment #4-1 relative to the emission reductions from the rule. As stated previously, Rule 1147 does not require the use of PTE and staff's analysis for this staff report, the Rule 1147 Technology Assessment, and previous rule developments does not use PTE to calculate emissions or emission reductions. The current rule and proposed amended rule provide owners and operators many other options to estimate emissions. However, PTE can be used to identify that at least 75% of units subject to Rule 1147 requirements have emissions less than one pound per day. PTE is a useful screening tool for most businesses affected by this rule.

Both Rule 1147 and the RECLAIM program have emission reduction commitments in the state implementation plan (SIP). These reductions cannot be used to offset one another. Additional reductions would be required beyond what has been committed to in the District AQMP.

Comment #4-8: Infrared burners should be exempted from the rule as in Rule 1153.1.

Response: Units fired solely with direct fired infrared burners are exempt from the emission testing requirement if certain operating parameters are met. This requirement is consistent with Rule 1153.1.

Comment #4-9: Recommendation to change the definition of relocation.

Response: The definition of relocation accurately describes this action and is consistent with other SCAQMD rules.

Comment #4-10: Units less than one pound per day of emissions should not have to comply if they become 30 years old so remove the age limit in (c)(1). Equipment should not have to comply with an emission limit if it is transferred to a different company at a different location so remove the work relocation.

Response: An equipment life of 30 years provides sufficient time for most units to be replaced. If an owner chooses to modify a very old unit to comply with the rule emission limit, the owner has that option. Thirty years is beyond the time an owner would have loan payments for a unit and the time a unit can be depreciated for tax purposes. Compared with new equipment, after 10 years of use, most units require major maintenance in order to continue operation. If an owner chooses to buy used equipment, to install in a facility, then that old unit should meet the same emission limit as a new unit. This principal is consistent with federal, state, and SCAQMD's new source review requirements. In addition, units with emissions of one pound per day or more must comply with BACT upon relocation. The rule must be consistent with SCAQMD Regulation XIII and require those units to comply upon relocating.

Comment #4-11: Change description of incineration equipment in Table 1.

Response: Staff has changed Table 1 in a way to better address the concern raised in this and similar comments.

Comment #4-12: Remove the requirement for equipment to comply at a certain age. The cost is to comply with the rule is too high.

Response: Please refer to the responses to comments 4-10 and 4-4.

Comment #4-13: The requirement to document meter readings should be monthly.

Response: Business owners have that option in the current and proposed amended rule, but may also choose to document meter readings daily.

Comment #4-14 and #4-15: Remove the requirement for calibrated meters and average monthly emission of 30 days.

Response: The proposed rule is written to be consistent with other rule requirements, SCAQMD policy, and standard permit conditions. Please see the response to comment #4-13.

Comment #4-16, #4-17, #4-18, and #4-19: Revise the screening Tables in (c)(6) to double the allowable operating hours because no equipment operates at 100% capacity. The hours in Tables 3 and 4 are incorrect and not based on the default emission factor.

Response: The screening tables in the rule are one way to document emissions less than one pound per day. Many other options are available. In addition, there are many units that do operate at 100% because the burners turn on at 100% of firing rate and then turn off when the temperature set point is reached. For these units, these tables are the simplest method to document emissions. The hours in Tables 3 and 4 are based on the emission factors referenced by the commenter but are slightly less than the hours from those calculations. The emission factor referenced is an average and some equipment will have higher emissions. The tables include a safety factor so that equipment owners know when they should consider using another more accurate method to document emissions of less than one pound per day.

Comment #4-20, #4-21 and #4-22: Comment on dual purpose burner and testing in (d)(7) relative to Table 1 in Rule 1147.

Response: The commenter has referenced the incorrect paragraphs in the proposed amended rule. However, consistent with other changes in PAR 1147 for incineration type devices, the proposed amended rule no longer identifies dual purpose burners as a two function device with a different emission limit when performing emission testing. The proposed rule changes address the recommendations in these comments.

Comment #4-23: Remove the term repair from (f)(1).

Response: This section of the rule identifies documents that must be made available to the SCAQMD in order to determine if a modification is a repair, a change in burner output, or a burner replacement. Rule 1147 requires maintenance records to be kept by the owner at the facility location.

Comment #4-24: Remove the age requirement in (f)(4).

Response: There is no age requirement referenced in (f)(4). Please refer to the response to comment #4-10 on the age requirement in the proposed rule.

Comment Letter #5: This comment supported the comments made in Comment Letter #4 stating that emissions for equipment are much lower than the potential to emit (PTE) calculated for new source review. This letter is comment letter #2 for the Final SEA but comment letter #5 for this staff report.

Response: As stated in responses to comments in this staff report, the Rule 1147 Technology Assessment, and the 2008 and 2011 rule staff reports, Rule 1147 does not require use of PTE to comply with rule requirements. In addition, staff analysis does not assume PTE for any calculations in this staff report, previous documents or the current CEQA analysis. The current rule and proposed amended rule provide owners and operators many other options to estimate emissions. However, PTE can be used to identify that at least 75% of units subject to Rule 1147 requirements have emissions less than one pound per day. PTE is a simple effective screening tool for most businesses affected by this rule.

REFERENCES

REFERENCES

EPA, 2002. *EPA Air Pollution Control Cost Manual, Sixth Edition (EPA-452-02-001)*, United Stated Environmental Protection Agency, January 2002

ETS, Inc. 2016. *Independent Technical Review of SCAQMD Draft Technology Assessment for Small and Low Emissions Sources Regulated by SCAQMD Rule 1147 (NOx Reductions From Miscellaneous Sources) Final Report*, SCAQMD Contract No. 16398, ETS, Inc., October 26, 2016.

SCAQMD, 2017. *Final Technology Assessment for Rule 1147 Small and Low Emission Sources*, South Coast Air Quality Management District, February 2017.

SCAQMD, 2007. *Air Quality Management Plan, Final 2007 AQMP Appendix IV-A, District's Stationary and Mobile Source Control Measures*, South Coast Air Quality Management District, June 2007.

SCAQMD, 1996. *1997 Air Quality Management Plan, Appendix IV-A, Stationary and Mobile Source Control Measures*, South Coast Air Quality Management District, November 1996.

Appendix A –Comment Letters Received

From: Marguerite Johnson [mcj92544@gmail.com]
Sent: Wednesday, March 01, 2017 5:32 AM
To: Wayne Barcikowski; Sam Wang
Subject: Re: Rule 1147 task Force

> On Mar 1, 2017, at 5:31 AM, Marguerite Johnson <mcj92544@gmail.com> wrote:

> Dear Sir,
> My name is Marguerite Johnson and I own and operate Circle of Life Pet Crematorium LLC located in Riverside County. I established COL in 1997 with one crematory unit and have since then added 3 additional units. I currently employ 7 full-time and 2 part time employees and have provided valuable services to thousands of bereaved pet owners and numerous veterinary hospitals and animal shelters throughout Southern California over the last twenty years.

#1

> In 2013 I met several times with AQMD engineer Rod Millican for counsel in how best to address our compliance with Rule 1147. Our situation is unique in that we do not have access to natural gas and operate entirely with propane. Our crematory is located in an agricultural area amongst citrus groves so through extensive investigation I have found bringing natural gas to our location is not a viable option. Mr. Millican also recommended updating / downsizing our cremation burner to a smaller high efficiency version. We replaced our primary cremation burner with a new 500,000 BTU Eclipse TJ0050 and updated our permit. We have been diligently working with the cremation unit manufacturer, burner manufacturers, and Total Air Quality for emissions testing and despite spending close to 30,000 dollars on updating equipment, testing and fees, to date we have not been able to reach the target of 60 ppm. I am not an engineer but have reached out to many resources regarding our situation and have been universally advised propane burns more efficiently than natural gas but with higher emissions. Even the daunting financial investment of purchasing new crematory units does not guarantee us compliance with current Rule 1147. Therefore I am looking for a realistic path to keep my business in operation and comply with AQMD requirements. Currently I have an extension allowing us to operate under the condition of limiting our propane usage to 78 gallons per day per unit. According to calculations by Total Air Analysis utilizing 78 gallons of propane / day limits our emissions to one pound per day. We have gas meters and maintain records for verification.
> I am requesting the task force to allow us to continue operating under this current 78 gallon propane / day restriction as a permanent resolution for compliance to Rule 1147. Or alternately raise the current NOx emission limit of 60 ppm (as specified for natural gas burners) to something realistically achievable for burners operating on propane. I strive to operate in an environmentally responsible manner and completely support the mission of preserving the clean quality of air in our beautiful Southern California but I am desperately looking for a resolution that will allow me to remain in compliance with AQMD rules that ensures the long term viability of my business. The livelihood of my family, my employees and their families depend upon it. I appreciate the opportunity to submit input on this rule and look forward to your feedback and direction.
>
> Respectfully yours,
>
> Marguerite Johnson
> Circle of Life Pet Crematorium LLC
> 43800 Whittier Ave
> Hemet CA 92544
>
> 951-536-1634 cell
> 951-927-8170 office

March 3, 2017

ENVERA CONSULTING

Via Electronic Mail Only
(wbarcikowski@aqmd.gov)

Mr. Wayne Barcikowski
Air Quality Specialist
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

Subject: Volcanic Red, LLC Comment Letter to Proposed Amended Rule (PAR) 1147

Dear Mr. Barcikowski:

On behalf of VOLCANIC RED, LLC DBA VOLCANIC RED COFFEES ("Volcanic Red"), ENVILEARN, LLC DBA ENVERA CONSULTING ("Envera Consulting"), appreciates the opportunity to submit the following comments related to the proposed amended rule (PAR) 1147 presented at the Public Workshop on February 15, 2017. Volcanic Red is a specialty coffee roaster located in Los Angeles.

#2

Volcanic Red supports the proposed amendments in Rule 1147 that will exempt food ovens (coffee roasters) from Rule 1147 and thereby regulating them under Rule 1153.1. During this time, we understand that coffee roasters will only need to meet the requirements of best available control technology (BACT), if the need is triggered during the permitting process.

While PAR 1147 does solve some of the challenges related to coffee roasters and the current Rule 1147, it does however, create an unknown for the future. Specifically, without seeing any proposal for Rule 1153.1, it does make it difficult to make capital decisions on equipment and upgrades since the future requirements for new, modified and/or relocated coffee roasters remain unknown at this time. In addition, it is unclear if the current emission limits of Rule 1153.1 will remain unchanged since coffee roasters exhibit a structure/configuration and emission relationship that is currently not being addressed by the AQMD (e.g., emissions from direct-fired coffee roasters vs. other configurations and burner types).

Again, we support proposed amendments in Rule 1147 as it relates to food ovens and look forward to working with you and the AQMD's Staff on the development of language for Rule 1153.1. Thank you for the opportunity to submit these comments. If you have questions regarding these comments, please feel free to contact me at +1 415 203 0520.

Sincerely,

Grant T. Aguinaldo
of ENVERA CONSULTING

cc: Gare Clark, Volcanic Red, LLC
Mike Ehler, Volcanic Red, LLC

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enveraconsulting.com

Wayne Barcikowski

From:	Marguerite Johnson <mcj92544@gmail.com>
Sent:	Tuesday, April 25, 2017 9:46 AM
To:	Wayne Barcikowski
Subject:	Rule #1147

Dear Mr Barcikowski,

#3

I have previously emailed you and Mr Wang on March 1 regarding my situation and Rule 1147 but have not had any feed back so I am resubmitting my information. I own and operate Circle of Life Pet Crematorium LLC in Hemet CA. We have been in operation since 1997, originally with one unit but over the years have added 3 additional units. I currently employ 6 full time and 2 part time people and provide services to pet owners and veterinary hospitals in Riverside, San Bernardino and San Diego Counties. Our situation is unique in that we are located in a agricultural area (citrus grove) of Riverside County and do not have access to natural gas. We operate strictly with propane and according to my research propane generally burns hotter but with increased emissions. We met several times with AQMD engineer Rod Millican several years ago to address Rule 1147. We followed up with his suggestions of updating/downsizing our cremation burner to a smaller high efficiency version, (500,000 BTU Eclipse TJ0050), investigated bringing natural gas to our location (not an option), and have worked with the manufacturers & Total Air Quality Emissions Testing in regards to 1147 requirements. This has become an expensive endeavor and to date we have not been able to reach the target of 60 ppm.

I am looking for a realistic path to keep my business in operation. Currently I am operating on an extension under the condition of limiting our prone usage to 78 gallons/ day per unit. According to Total Air Analysis utilizing 78 gallons propane / day limits our emissions to 1 pound per day.

I am requesting the task force to consider raising the Nox emission limit of 60 ppm (as specified for natural gas burners) to something more achievable for burners operating on propane and/or allowing us to continue to operate under the daily limit of 78 gallons / day as permanent solution.

I am searching for a solution that will allow me to remain in compliance with AQMD rules there by ensure long term viability of my business for me and my employees.

Thank you for your consideration in this matter. I plan to attend the June 2 hearing on this rule.

Marguerite Johnson
Circle of Life Pet Crematorium LLC
951-536-1634

The following is Comment Letter #4 for this Staff Report and Comment Letter #1 For CEQA

FDI

Furnace Dynamics, Inc.
261 Euclid Ave.
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May 9, 2017

Ms. Barbara Radlein
Program Supervisor, CEQA Special Projects
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

Dear Ms. Radlein,

We have reviewed the PAR 1147 CEQA document presented March 23, 2017and have provided our comments below for your consideration. I hope these comments will be helpful in finalizing your final Environmental Assessment.

Page 3-2 Table 3-1: "Typical Uncontrolled NOx Emissions"

The emission values are in most cases extremely flawed. We have seen no evidence that any of the values in the chart are accurate and directly applicable to Rule 1147 devices.

Since the mid-1990s we have pre-tested well over 500 devices of all types of equipment including a significant number of RECLAIM sources. This also included approximately 200 parallel testing of these same devices with source test companies. The chart states the "Metal Heat Treating" and "Metal Melting Furnace" categories have uncontrolled emissions from 150-210 ppm. This is only applicable to furnaces with recuperated air systems that preheats the combustion air typically from 600°F – 1200°F with the net effect of increasing flame temperature and thus NOx emissions. We know of only one preheated air system that fits this profile in the Rule 1147 realm. That furnace was used to reclaim sand which showed a pretest value of about 156 ppm. This facility is no longer in 1147. We feel the values of the other classifications on Table 3-1 are also vastly overstated. 1-1

In the last 3.5 years, we have conducted over 225 pretests on both high and low temperature devices. The temperature ranges go from ovens that run at 300°F – 800°F and high temperature devices that can operate up to 2200°F. The non-preheated air systems are typically less than 100 ppm for high temp furnaces in the above categories. For low temperature devices such as powder coat ovens and other low temperature devices that operate well less than 1200°F the values are usually significantly less than 100 ppm. The chart states these devices are 120 ppm NOx, which on average, is probably double the actuals.

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Thus, the concern is the values indicated in the baseline inventory are dramatically overstated for Rule 1147 devices. Therefore, the overall emission reductions are overstated pursuant to rule requirements. This concern has been stated in taskforce meetings. If staff has evidence to support these values stated in Table 3-1, we would like to have them presented to us and the regulated community. That information should include the number of devices tested, what temperatures, how the tests were conducted, by whom and what b-cat categories were included to substantiate the values presented in Table 3-1.

On page 4-6 it states that the emission inventory for PAR 1147 is the inventory used for the 2008 rule adoption. As indicated above, we feel the basis for the inventory is significantly overstated.

The issue regarding the impact of a less stringent rule profile is the accuracy of the 0.9 ton per day declaration. It should be understood that a significant number of small sources are not required to report emissions on the AER program due to the di minimus nature of the emissions profile.

Even at that, with the staff utilizing a default emission factor of 130#/MMcf (101.4 ppm), the actuals are overstated.

We believe, other less than 1#/day devices would also fall into the same category of minimal emissions profile. And, as stated above there is no records of emissions due to the established criteria for inclusion of NOx data in the AERs. 1-1 cont.

On a study of the auto body industry that included 35 companies and 56 booths, with a total of 844 months of invoices evaluated the average was 0.125 #/day. The maximum input in the group was 1.2 MMBTU/hr and average was 751,516 BTU/hr.

By using this average and using PTE, the daily NOx values would be:

751,516 BTU/hr / 1050 = 715.73 cf/hr

715.73 x 24 = 17,177 cf/day / 1,000,000 = 0.017 MMcf x 130 = 2.233 #/day

Thus, by comparing the PTE of 2.233#/day to the actual average of .125#/day, the actual is only 5.6% of PTE.

The document states there are significant number of devices >1#/day. If the analysis conducted, was based on the default emission factor of 101.4 ppm and PTE, many of the devices originally thought to be >1#/day would probably fall well under 1 pound per day.

Please review the summary of multiple types of companies PTE vs. actual gas consumption included in this writeup.

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It is important to note that this information is available, in most cases, from the Districts AER (Annual Emission Report). We should compare the maximum input of each permitted device in the respective plants relative to PTE. In my evaluation *"Percent of PTE – Multiple Facilities"* the study included AERs for many clients. Some of these clients had Rule 219 equipment. I included the 219 equipment in the total maximum input calculations. Many others, emissions are so low that they are not required to report emissions. The values also include permitted and non-permitted equipment and were based on So. California Gas Company invoices. 1-1 cont.

On page 4-10 ***Relationship Between Short Term Uses and Long Term Productivity***

A statement indicates that NOx is a precursor to ozone and PM2.5. Please refer to *Final PM2.5 Calculation Methodology, October 2006*, Table 3, page 5 which states (for external combustion sources) that 99% of PM10 is actually PM2.5. Therefore, the only way to reduce the amount of PM2.5 is to shutdown equipment or become significantly more efficient. Based on our review of the low NOx technology there are decreases in efficiency, due to the higher use of excess air to reduce the hot mix temperatures and thus lower NOx. There are some increases in efficiency due to improved control. We have seen no substantive evidence that there is an imbalance in loss vs. increase of efficiency in the application of low NOx burners to 1147 devices. Therefore, since the PM10 (PM2.5) is related to gas use not NOx emission profiles, rule 1147 emission reduction requirements' will not have any substantive effect on PM2.5. 1-2

Evaluation of Alternatives:

Issues which are of the alternatives represent a balance of emissions reduction and have a major impact on the regulated community.

Issues of BACT

1. The current BACT requirements exempt the requirement for installing BACT equipment if the device emits less than 1 pound per day NOx. Thus, the extended compliance on alternative 4 maintains the requirements for BACT when the unit or burner is replaced. As long as the less than a pound per day is maintained; we believe this alternative would be the best solution. 1-3

Issues of Cost Effectiveness

1. The other item not discussed but eminently important is the issue of cost effectiveness. We have conducted many cost effectiveness analysis of devices using the Minor Source Cost Effectiveness formula. In the sources that are less than 1 pound per day the cost effectiveness values in many if not most cases far exceed $100,000/controlled ton of reduction. A number of examples exceed $1,000,000/ct. As an example, to put this in prospective, large RECLAIM 1-4

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power plant NOx reductions show cost effectiveness values of about $3,000/ct. Aside from the BACT issue at less than 1 pound per day limitation, the small devices (small companies) have an economic burden that far exceeds the large utilities and refineries. These utilities have millions of customers and thus any costs are spread over these customers – making the incremental cost to them extremely small. Small companies have few customers by comparison and the cost effectiveness is a significant burden on their profitability and ability to stay in business as well as the ability to have their businesses in California. 1-4 cont.

Table 5-2

Alternative Proposed Project, B, C and D all have the same forgone emissions of 0.9 tons/day – thus from an emission standpoint there are no differences. However, as we have previously stated the 0.9 t/d value may be overstated, thus the alternatives will have less impacts that the document defines. 1-5

Alternative B, C and D all have the same air quality impacts relating to the 0.9 tons per day, however, Alternative D indicates no recovery of emissions in the future. Since the proposed rule requires that if there is a replacement of the burner or device, compliance will be required. Thus, at some time the emissions will be reduced. However, these are mostly related to the <1#/day threshold, therefore, since they are not required to be BACT due to the limited emissions, the recovery is a moot point. As stated in the document, many of these are probably at 0.3#/day. Since the 0.3# value is based on the default emission factor of 101.4 ppm, it could be said, the actual emission reduction from retrofitting would be minimal at best. Bear in mind that if the requirement is 20 years or 25 years, since they are less than 1#/day, they are not and would not be required to retrofit the device. 1-6

BACT Issues:

Since **Alternative 4** exempts pressure washers due to the excessive cost and difficulty to retrofit (in some cases over $200,000) and there are a very limited number of these in the SCAB, the impact of exemption is marginal at best.

Alternative 4 also requires adequate recordkeeping, this is completely acceptable as an alternative measure. If the 1#/day is exceeded, retrofit is required whenever it occurs. 1-7

Amalgamation of **Alternative C and D** appears to be the best solution with minimal impact to the environment.

Conclusion: Since we believe the forgone emissions of 0.9 t/d are significantly above the actual emissions on a wide variety of devices, Alternative C and D offer the best solution, without

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placing a significant economic burden on industry in the future years. An additional consideration, since the RECLAIM program is being phased out, the emission reductions accrued the reinstallation of command and control rules from the large emitters will more than offset the estimated forgone emission from the proposed rule and Alternatives.

It is highly problematic that staff chooses to use PTE to determine the emissions profile of the grouping of 1147 devices. The net effect is to overstate the emissions as a group and thus overstate the forgone emissions – without conducting an in-depth analysis of the actual emissions of these facilities. Additionally, the staff chooses to use the default emission factor of 130#/MMcf natural gas (101.4 ppm) to quantify the emissions profile regardless of type of equipment 1-7 cont.

PAR Rule 1147: The following comments relate to the proposed PAR 1147 rule language. A revised version dated May 2, 2017. We will provide staff with comments relating to those revisions.

1147(b)(9) Infrared burners since these burners are exempted by 1153.1 (without qualification) they should be exempted from 1147 1-8

Page 1 – 1147(b)(4) Recommend the wording be changed to change of location something to the effect that *"No modification is required to an existing unit, if the equipment is the same as was permitted and operated at a previous location, provided no modification to the equipment has been made that would change rated input BTU capacity or emissions profile."* 1-9

Page 4 – 1147(c)(1)(A) The word *"relocated"* should be removed. If a unit is less than 1 pound per day and maintains documentation substantiating the classification – a 30-year limitation should not be applied. The rule does require the permit holder to provide annual maintenance to the equipment. 1-10

Table 1:

Add *Multi chambered* to the dual chamber. For example, a heat set lithography press, three heat set presses exhaust all go into an afterburner, therefore the multi chamber definition would apply. 1-11

1147(c)(6) eliminate 35 years – since these less than 1#/day devices are not required to comply with BACT and keep records, they should not have to retrofit in the future. The rule requires annual maintenance records therefore, if properly maintained, they should remain less than 1 pound per day. Also, consider since many of these are well less than 0.5 pounds per day, the future cost would be astronomical in a cost per controlled ton basis. 1-12

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1147(c)(6)(C) Read timers once per month. 1-13

1147(c)(6)(C) change "*calibrated*" to only the fuel meter not a non-resettable timer. 1-14

1147(c)(6)(C) Remove the less than 22 pounds per month an reinstate the 30#/month. 1-15

1147(c)(6)(C) Revise the timer to 50% of maximum input not maximum input. No devices in 1147 operate at 100% capacity. No device operates at PTE since all devices are controlled by a temperature controller with specific set points for a given process. See writeup on PTE and refer to the dialogue on the CEQA document relating to actual vs PTE. 1-16

Table 3 See the included chart relating to the emission factors calculated based on hour considerations for the specific input values. 1-17

Table 4 See chart to correct the hours per month that should be allow for the specific input values. 1-18

(c)(6)(F) Note the value of 7,692 cf/day is based on the default emission factor of 130#/MMcf or 101.4 ppm. The Table 3 and 4 are not based on 101.4 ppm but higher values. This is inconsistent. 1-19

(d)(7) identifies units with one dual purpose burner that both heats and incinerates VOC, toxics or PM demonstrates compliance with the following. 1-20

(d)(7)(A) If there is only one burner the only place to test is the emission stream exiting the device, thus only one test is required. 1-21

(d)(7)(B) This is no longer valid due to the chance in Table 1. 1-22

(f)(1) Remove repair, if a system is repaired to the same configuration as the original burner, no emission changes are present. Also, remove the change of location from the revision. 1-23

(f)(4) Remove the reference to 30 years. If the unit is <1#/day and is maintained per rule requirements, there is no need to replace it in 30 years since it will still be less than one pound per day. 1-24

Should you have any questions feel free to call me any time.

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Sincerely,

Anthony W. Endres
President

Enc.

cc. Dr. Philip Fine
Mr. Tracy Goss
Mr. Gary Quinn
Mr. Wayne Barcikowski

This page is an attachment and referenced in Comment #1 of this letter.

Percent of PTE - Multiple Facilities
Rule 1147 Companies

Type	Duration Years	Percent of PTE
Medium Forge	1	10.8%
Medium Forge	1	19.6%
Heat Treat	1	16.7%
Powder Coat	6	14.9%
Powder Coat	1	12.0%
Furnature Mfg	2	13.9%
Autobody Study	multiple	5.6%
	Average	**13.4%**

Notes:
1. The maximum of all devices were added for a total input
2. The input was converted to cubic feet x 24 x 365
3. The gas consumption was based on Gas Co invoices
4. The percentage is based on PTE vs. Actual Consumption
5. Autobody study included 56 booths, 844 months of Gas Co. invoices

This page is an attachment and referenced in Comment #16 of this letter.

FD

Furnace dynamics, inc.
261 Euclid Ave.
Long Beach, CA 90803
562-433-3025

November 19, 2015

A discussion on Potential to Emit (PTE)

Potential to Emit is defined as the maximum amount of emissions that can be generated from a device operating at maximum capacity, 100% all of the time, twenty-four hours per day, seven days a week. On an annualized basis that number would be multiplied by 365 days per year. Whereas this is a relatively simplistic approach to determining emissions, it actually is impossible for devices to operate under these conditions. They can only operate under these conditions for relative short intervals when the equipment is first fired. The reason has to do with the fact that all of the devices in Rule 1147 are based on a defined operating temperature. This is true from forging, heat treating, metal melting, powder coating, crematories, cooking ovens, etc.

For example, I have designed combustion systems for over 120 furnaces in forging, heat treating and metal melting. Categorically, no device design is based on PTE. They are based on the objective for the process; the production throughput, operating temperatures, refractory losses, etc. It boils down to the net available heat to do work in the furnace or oven, after combustion losses balanced with the production of a given product.

On direct fired forge furnaces, the typical operating temperature range can be anywhere from 800F to as high as 2250°F and they can be in the same furnace. The theoretical flame temperature under optimal air fuel ratio conditions is between 3000°F and 3100°F. To put this into perspective, carbon steel in a molten state is cast at temperatures around 2900°F to 3050°F. Thus if operated in a typical high temperature furnace you could melt metal. Since the operating temperatures are dramatically less, the firing rate overall is consequently less. Since different alloys require tight control on operating temperatures, the heat input must be precisely maintained to not metallurgical destroy the parts contained in the furnaces. For instance, titanium is finish forged at 1750°F. If the temperature goes to 1825°F, the parts are scrap. It can thus be seen that it is impossible to operate at PTE without destroying parts. This goes for any operating range.

This is true regardless of the process albeit, in the metals industry, powder coating, burn off and a plethora of other processes covered in Rule 1147. They all provide heat input to match a specific set point temperature that are required to maintain the product quality necessary to satisfy customer needs. When looking at powder coating, the low NOx burners provide an operating temperature of between 300°F and 650°F, particular powder materials require tight temperature control. If that temperature is exceeded, the powder will be burnt, rendering the parts unusable. Due to the nature of oven burners and the necessity to achieve 30 ppm, the burners typically operate at higher amounts of excess air than high temperature operations. Even

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so, the actual flame temperatures can reach over 2000°F. Again, the PTE value would be incorrect to apply as a determinate consideration of emissions and thus pound per day emission profiles.

Actual Annual Use vs. PTE: To make the determination of actual vs. PTE, we acquired So. Cal Gas Company annual use in therms, converted them to millions of cubic feet, then got to total BTU/hr maximum input of each device in the plant and correlated the actual MMcf to the potential if operated at the maximum input, 24 hours per day on an annual basis. I conducted a study to determine the correlation of PTE to actual usage on two forge plants, one very large and a medium small shop. By the above method, the large forge facility was operating at a 25% of PTE. On the smaller facility there were gas consumption limits on all of their furnaces. The actuals were 19.6% of the permit limits which was well below the devices PTE. This facility was evaluated for actual annual vs. PTE and the results showed 10.82%. I have just completed an evaluation of a couple of powder coating companies. One had an actual annual, compared to PTE of 12%. Another powder coat facility showed a six-year average of 10.49%. during the six years the annual averages ranged from 9.16% to 11.99%. It is important to understand that these facilities were operating under normal production capabilities. Some companies are single shift, others are two shift and one is a three shift operation 5 days per week. I will be conducting additional analysis on a number of other facilities and forwarding those values to staff. However, I would believe the Actual compared to PTE is going to be in the 10% - 25% range.

Included Charts: I have included a series of charts that can provide a level of understanding of the relationship of daily emissions vs. BTU input vs. hours of operation at a variety of different average firing rates. The first charts are related to the SCAQMD default emission factor of 130#/MMcf natural gas or 101.4 ppm. The first chart shows the correlation of values assuming 100% of the capacity of the combustion system or PTE. The next three charts show the same correlations of firing rate to hours of operation at 50% of PTE and 20% of PTE. The fourth chart shows how high the BTU rating could be per hour of operation and still stay under 1#/day of NOx. The last three charts show the same data but based on a lower emission value of 60 ppm.

It can be seen the lower emission values reflect a substantially lower pound per day emission value. This is for illustrative value only. However, it should be understood that few devices operate anywhere near the default ppm values. In the last 3 years I have conducted approximately 175 pretests (mostly on 1147 devices) using a Testo 350 combustion analyzer. I have also parallel tested about 70 official source tests and my readings are typically less than 2 ppm deviation from the official source test results. I have yet to see any device that operated near the 101.4 ppm level. The lower temperature devices such as ovens are even lower relative to the default emission factor. Thus even with the values shown on the first 4 charts, the pound per day values are overstated.

Innovative Consulting and Furnace Designs For Industry

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I believe a collaborative effort on behalf of District staff and industry representatives can arrive at a reasonable means of determining what constitutes one pound per day usage. Perhaps the simplest approach could be the use of non-resettable timers on devices, with a limit of X hours per day for a given BTU input. Obviously this would have to be backed up with logs of hours of operation that could be verified by an inspector. If, as was suggested in the 1147 Task Force Meeting, an exemption (or an extended compliance date) be given to devices operating at less than a pound per day, verification is essential. There could be other means of quantification of daily emissions – these need to be discussed in a meaningful way to determine what works for the District and industry.

As always, we appreciate the opportunity to work with staff to assist in developing a bridge of understanding of how industry actually operates. Should you have any questions regarding this subject, please feel free to engage me in a meaningful dialogue to assist in developing rules that relate to real-world conditions.

Sincerely,

Anthony Endres
President

This page is an attachment and referenced in Comments #17, #18 and #19 of this letter.

Review of PAR 1147 Table 3 and 4

Table 3 - Small and Low Use Unit Daily Operating Limits

Converting to Actual ppm NOx

BTU/hr	Hours/day	#/day	Actual ppm
325,000 - 400000	16	0.792	127.97
400,001 - 500,000	14	0.867	117.00
501,000 - 800,000	8	0.792	127.97
800,001 - 1,000,000	6	0.743	136.50
1,000,001 - 1,200,000	5	0.743	136.50

Notes:
1. "#/day" is based on 101.4 ppm (130#/MMcf)
2. "Actual ppm" corrilates #/day vs. hours converted back to ppm
3. The highest value was used for actual ppm

Table 4 - Small and Low Use Unit Monthly Operating Limits

Converting to Proper Monthly Hourly Limit

BTU/hr	PAR 1147 Hours/Month	#/month	Hr/mo = 29.96#/mo	#/mo
325,000 - 400000	352	17.43	605	29.96
400,001 - 500,000	308	19.07	484	29.96
501,000 - 800,000	176	17.43	302	29.96
800,001 - 1,000,000	132	16.34	242	29.96
1,000,001 - 1,200,000	110	16.34	202	29.96

Notes:
1. Cubic feet per day natural gas = 7,682
2. Hr/mo = 29.96 #/mo is based on 1050 BTU/cf and 130#/MMcf
3. The highest value was used for actual ppm

The following is Comment Letter #5 for this Staff Report and Comment Letter #2 For CEQA

Comment Letter #2

From: Paul Engel <paulkengel@gmail.com>

Sent: Thursday, May 11, 2017 12:10 PM

To: Barbara Radlein

Cc: Anthony Endres; Gerry Bonetto

Subject: Proposed Amendment Rule 1147

Barbara

I was in receipt of Mr Endres' comments to CEQA document and proposed Rule 1147. I have been involved with permitting and compliance consulting since 1988. I find that Mr. Endres' comments reflects more correctly actual operations of combustion equipment versus theoretical rated design values. I have worked and continue to work with printers with natural gas-fired dryers for heat-set web-fed printers within AQMD jurisdiction. PTE is an intellectual value with minimal reflection on actual operations. The rated heat input is only experienced for cold start-up to get the oven to operating conditions quickly. If the printers operated at the rated maximum heat inputs. the printed product would be unusable because the printed product would be damaged because of curdled or blistered substrate or in fact would likely cause press fires. 2-1

Thank you for considering the revisions to Rule 1147.

Paul Engel

714-473-8036

Appendix B – Final Technology Assessment for Rule 1147 Small and Low Emission Sources

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Final Technology Assessment for Rule 1147 Small and Low Emission Sources

February 2017

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APPENDIX O: ETS, INC. Independent Technical Review of SCAQMD Draft Technology Assessment for Small and Low Emissions Sources – Regulated by SCAQMD Rule 1147 (NOx Reductions From Miscellaneous Sources

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Background

SCAQMD Rule 1147 – NOx Reductions from Miscellaneous Sources was adopted in December 2008 and is an important component of the attainment strategy to meet the federal annual PM2.5 ambient air quality standard as well as meet the ozone standard. The rule regulates NOx emissions from combustions sources that were not addressed by SCAQMD rules other than Rule 474 – Fuel Burning Equipment - Oxides of Nitrogen. Rule 474 was last amended in 1981 and limits NOx emissions rates from equipment burning gaseous fuels to 125 ppm and equipment burning liquid and solid fuels to 225 ppm (at 3% oxygen). Many categories of equipment used in a wide variety of processes are now regulated by Rule 1147. However, similar equipment can have a wide range of operating characteristics, process temperatures and emissions rates. Because of the number and variety of equipment affected, the rule compliance schedule was phased in over 10 years starting in 2010.

Rule 1147 was amended September 2011 to address compliance challenges, remove a requirement for fuel or time meters, delay compliance dates and provide regulatory relief to affected businesses. Throughout the rule amendment process, discussions with affected businesses, equipment manufacturers, and installers focused on concerns that there were many unique pieces of equipment and on the availability of cost effective and affordable low NOx technology. A major concern was the impact of the rule on small and low use equipment with NOx emissions of one pound per day or less. To address this challenge, the amended rule provided two solutions: first, sources with daily emissions rates less than or equal to one pound per day were given a delay of up to two years (until 2017 at the earliest) before they were required to comply with emission limits. These small and low emission units originally had compliance dates five years later than larger units. Second, Rule 1147 included a requirement that staff perform a technology assessment for these small and low emission sources that are not typically subject to the best available control technology (BACT) requirement as new sources.

Technology Assessment

Initially the technology assessment targeted sources where burner technology was either not available or the retrofit cost is comparable to the cost of replacing the unit. Several categories of equipment were identified and removed from Rule 1147 and the requirement for a permit through the May 2013 amendments to SCAQMD Rules 219 and 222. Staff continued its technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens to move existing in-use food ovens, roasters and smokehouses from regulation by Rule 1147 into their own rule. Rule 1153.1 was adopted in November 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits and later compliance dates. In addition, Rule 1153.1 provided a small source exemption for existing in-use units with emissions of up to one pound per day.

The last phase of the technology assessment focuses on the remaining categories of Rule 1147 equipment that were not addressed through the Rule 219, 222 and 1153.1 actions. This assessment utilizes information on affected equipment from the SCAQMD permit system, SCAQMD emissions testing programs and discussions with equipment and burner manufactures, affected businesses, consulting engineers and industry and business representatives. This report provides information on the types and number of equipment affected by Rule 1147, emission characteristics of these equipment and estimates of the cost and cost effectiveness of replacing old burners. Taken together, this information provides insight into compliance and affordability challenges faced by businesses affected by Rule 1147. While the focus of this report is on equipment with NOx emissions of 1 pound per day or less, the report also includes information and analysis applicable to larger units. This information is provided in order to address stakeholder's concerns regarding the availability of technology for larger equipment.

Staff conducted extensive outreach to equipment manufacturers and product installers. Staff went into the field to identify equipment that will comply with Rule 1147 emission limits with available burners and those that may not. Rule development staff has worked closely with industry representatives and other staff to develop solutions to unique compliance challenges. These discussions resulted in a number of proposals to staff that are included in this report.

Ten major categories of equipment were evaluated through the technology assessment including: afterburner technologies, spray booths, crematories, fryers, heated process tanks, metal melting furnaces, heat treating, multi-chamber burn-off ovens and incinerators, ovens and dryers. As a result of this assessment, the following five recommendations are proposed for consideration in future rule development:

- Exempt sources with total rated heat input less than 325,000 Btu per hour from the Rule 1147 NOx emission limit (Alternatively, the emission limit for low temperature systems with these burners could be changed to 60 ppm NOx and the limit for high temperature systems would continue to be 60 ppm)
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of all multi-chamber burn-off ovens, burn-out furnaces and incinerators for all process temperature
- Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until such time the combustion system or tank is modified, replaced or relocated
- Delay compliance with the NOx emission limit for existing in-use spray booths until the heating system is modified or replaced or the unit is relocated
- Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified or replaced or the unit is relocated

Staff estimates that 4,900 to 5,650 out of 6,400 units would be affected by these proposed changes. Staff will continue working with members of the Rule 1147 Task Force and other stakeholders to collect additional information regarding the feasibility and cost of replacing combustion systems in small and low emission equipment subject to Rule 1147.

An RFP was released in February 2016 to solicit proposals for an independent review of the draft technology assessment. ETS, Inc. was selected to review the technology assessment by a panel consisting of individuals from SCAQMD, Ventura County APCD, Furnace Dynamics and California Small Business Alliance. ETS began review of the technology assessment in June 2016 and met with the Rule 1147 Task Force to solicit comments on the draft technology assessment prepared by staff. ETS completed their review of the draft technology assessment and information provided by stakeholders in October 2016. The Rule 1147 Task Force and other stakeholders were presented the results and findings of the ETS review on November 8, 2016.

The ETS review of the draft technology assessment resulted in the following findings:

- On availability of technology to achieve rule emission limits:
    - Low Temperature Processes – Technology is available to achieve 30 ppm NOx except for burners rated less than 400,000 Btu/hour
    - High Temperature Processes – Technology is available for all sizes of burners
    - Heated Spray Booths – Technology is available for small and large booths
- ETS agrees with staff to amend rule to address technology concerns:
    - The smallest low NOx burners available that achieve 30 ppm for low temperature processes are 400,000 to 500,000 Btu/hour
    - Retrofitting heated process tanks that do not comply with the NOx limit requires replacement of the whole system
    - A 30 ppm emission limit for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators is not possible with the preferred burners
- ETS additional recommendation:
    - Recommend to change NOx emission limit for afterburner processes operating at temperatures less than 800° F from 30 to 60 ppm (SCAQMD staff is also considering to change the emission limit for related types of process that do not have integrated afterburners)

- On the cost effectiveness method used by SCAQMD staff:
  - ETS agrees with the method used by staff because it is consistent with the EPA method used by other agencies and with the method used for rule development and for other district programs
- Costs used for analysis are representative of costs for equipment and installation of burner systems:
- Agree with staff proposal to amend rule to address the following concerns:
  - Replacing heating systems on existing in-use spray booths may result in a cost effectiveness higher than SCAQMD criteria used in other programs
  - Retrofitting units with daily emissions of less than 1 pound/day may result in a cost effectiveness higher than SCAQMD criteria used in other programs

ETS's review of stakeholder comments found that where sufficient detail was made available, the cost effectiveness of examples provided by stakeholders were consistent with the findings of this technology assessment. However, much of the cost information provided was for larger equipment and not applicable to the small sources that are the subject of this assessment. In addition, for some of the examples provided, there was not sufficient detail to identify the basis of the total project costs provided to ETS. Moreover, the cost provided did not include information on installation of more efficient components and control systems that are eligible for rebates from utilities, that reduce initial project cost, and that reduce utility costs throughout the life of the rebuilt equipment.

BACKGROUND

INTRODUCTION

The California Health and Safety Code requires the AQMD to adopt an Air Quality Management Plan to meet state and federal ambient air quality standards and adopt rules and regulations that carry out the objectives of the AQMP. The California Health and Safety Code also requires the AQMD to implement all feasible measures to reduce air pollution.

SCAQMD Rule 1147 was adopted December 2008 and because of the number and variety of equipment affected, the rule compliance schedule was phased in over 10 years. The NOx reductions from Rule 1147 are a vital component of our attainment strategy and essential for achieving compliance with federal and state ambient air quality standards for PM2.5, PM10 and ozone. Rule 1147 was also amended in September 2011 to address compliance challenges and provide regulatory relief for affected businesses.

REGULATORY HISTORY

Rule 1147 – NOx Reductions from Miscellaneous Sources, was adopted by the AQMD Governing Board on December 5, 2008. Rule 1147 incorporates two control measures of the 2007 Air Quality Management Plan (AQMP): NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MCS-01).

Control measure MCS-01 proposed that equipment operators meet best available control technology (BACT) emission limits at the end of a combustion system's useful life. Control measure CMB-01 proposed emission NOx limits in the range of 20 ppm to 60 ppm (referenced to 3% oxygen) for ovens, dryers, kilns, furnaces and other miscellaneous combustion equipment. Emission reductions from the equipment addressed by Rule 1147 and control measure CMB-01 of the 2007 AQMP were proposed in prior AQMPs (e.g., control measure 97CMB-092 from the 1997 AQMP).

Rule 1147 was amended September 9, 2011 to delay implementation dates one to two years, remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. In addition, the rule includes a requirement for a technology assessment for small and low emission sources that are not typically subject to the best available control technology (BACT) requirement as new sources.

RULE REQUIREMENTS

Rule 1147 established nitrogen oxide (NOx) emission limits for a wide variety of combustion equipment and affects both new and existing (in-use) combustion equipment. Rule 1147 requires equipment with AQMD permits that are not regulated by other NOx rules to meet an emission limit of 30 to 60 parts per million (ppm) of NOx depending upon equipment type and process temperature. The compliance schedule for existing equipment is phased in over 10 years starting in 2010. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of existing equipment are provided at least 15 years of use before they must meet rule emission limits. The first group of equipment affected had to comply with rule emission limits when they were 20 to 30 years old. Owners of small units and units with emissions of one pound per day or less will comply with emission limits later starting in 2017.

Rule 1147 also establishes test methods and provides alternate compliance options including a process for certification of equipment NOx emissions through an AQMD approved testing program. Certification eliminates the requirement for end-users to test their equipment. Other rule requirements include equipment maintenance and recordkeeping.

In developing the rule, staff worked extensively with many stakeholders. Staff held Task Force meetings with representatives from affected businesses, manufacturers, trade organizations and other interested parties. Staff also had separate meetings with manufacturers and distributors of equipment and burner systems. In addition, staff met individually with and visited local businesses to observe operations and equipment affected by Rule 1147. Staff committed to continued discussion with industry through the Rule 1147 Task Force and meetings with individual businesses on issues affecting small business including availability of low NOx burners for unique applications and specific processes.

The majority of the comments made at the Public Workshop and Task Force meetings for the 2011 amendment supported the proposed delay of compliance dates and limits on the use of meters. However, some consultants commented that the compliance delay was not needed and the AQMD should have made a greater effort to educate businesses affected by Rule 1147. An enhanced outreach program to the regulated community was a high priority for the AQMD.

The comments on the proposed amendments received at the workshop and meetings for the 2011 amendment typically fit into two categories. One set of comments dealt with implementation of the rule and asked for clarification or simplification of rule requirements. In response, staff proposed a number of changes relating to equipment identification, maintenance, recordkeeping, and source testing requirements, which ultimately will result in cost savings compared to the original rule. In addition, the amendment added a mitigation fee option that allows business with equipment emissions greater than one pound per day to delay compliance by three years but will provide emission reductions from other sources during that three year period. Together with AQMD efforts to streamline the permit modification process, the amendment helped businesses comply with rule requirements.

The second category of comments received addressed issues beyond the scope of the 2011 amendment which was crafted to respond to the compliance challenges existing at the time. These comments included proposals for new alternative industry-specific rules, questioning availability of low NOx replacement burners, requests for exemption from the rule for small sources, requests to reevaluate rule cost and cost effectiveness and a request to require a cost effectiveness analysis for every piece of equipment subject to the rule. To address many of these issues and as previously stated, the rule amendment committed the

SCAQMD to conduct a technology assessment for smaller sources with emissions of one pound per day or less no later than 18 months prior to the first effective compliance date for these smaller sources (July 1, 2017).

AFFECTED INDUSTRIES AND EQUIPMENT

A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, food products preparation, printing, textile processing, product coating; and material processing. A large fraction of the equipment subject to Rule 1147 heats air that is then directed to a process chamber and transfers heat to process materials. Other processes heat materials directly such kilns, process tanks and metallurgical furnaces.

Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the District (NAICS 21, 23, 31-33, 42, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92). The units affected by the rule are used in industrial, commercial and institutional settings for a wide variety of processes. Some examples of the processes regulated by the rule include metal casting and forging, coating and curing operations, asphalt manufacturing, baking and printing.

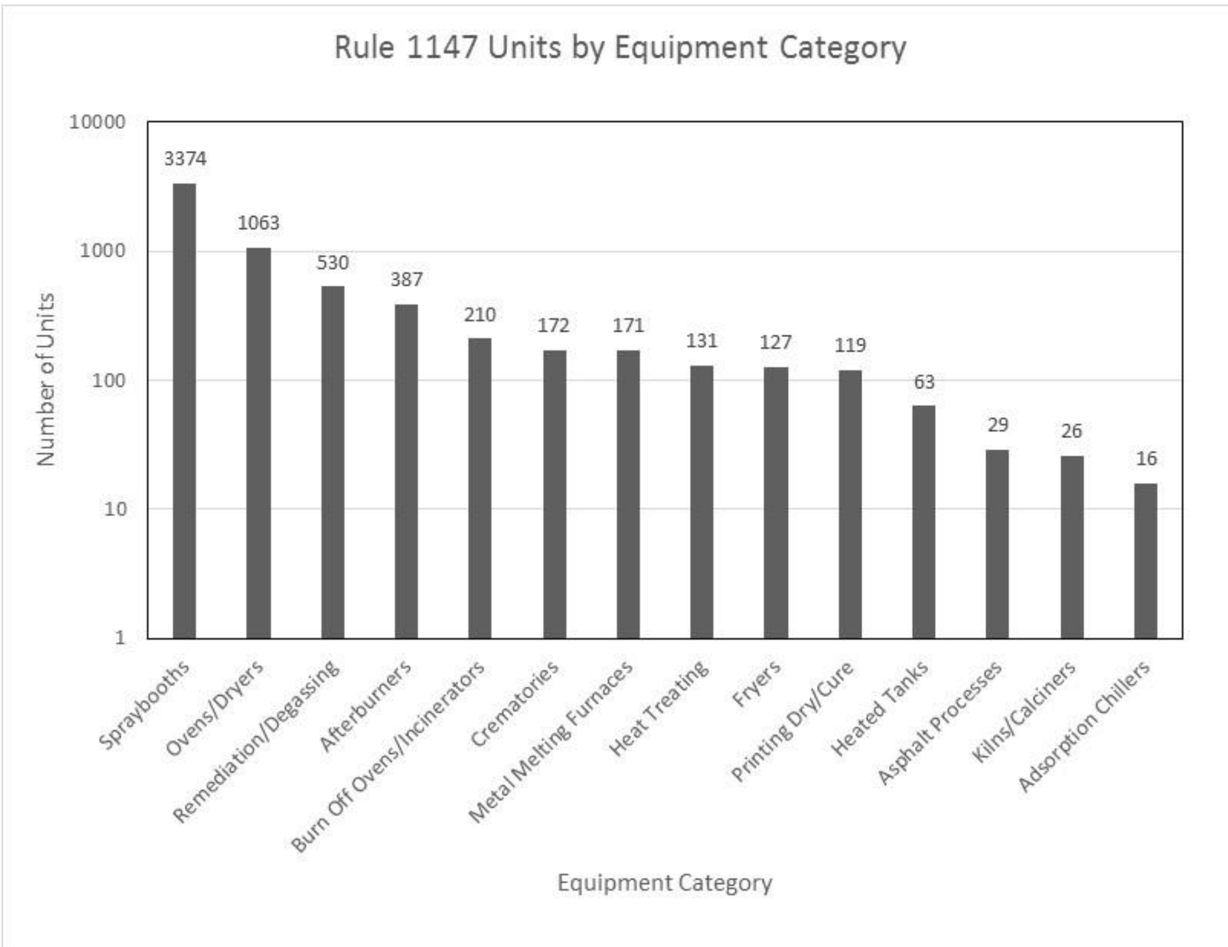
Staff originally estimated approximately 6,600 units subject to the emission limits of Rule 1147 are located at approximately 3,000 facilities. Staff estimated that about 1,600 units at about 800 facilities affected meet the NOx emission limits of Rule1147. This leaves about 2,200 facilities that are expected to require retrofit of burners in their equipment. Staff estimated as many as 2,500 permitted units with NOx emission limits greater than one pound per day and an additional 2,500 permitted units with NOx emission limits of less than one pound per day will require modification to comply with the emission limits.

Based on an update of the active permitted equipment in the SCAQMD, an estimate of the number of equipment potentially subject to Rule 1147 and the fraction of units in different categories is presented in Figure 1-1. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

The second largest category of equipment is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the Figure 1-1.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with high temperature processes (metal melting, heat treating, burn off ovens, kilns and crematories) being the next largest group with approximately 700 units in these five categories. Although these categories have fewer equipment, many units have significantly higher emissions than spray booths and small ovens. Appendix A provides a more detailed summary of the industries and equipment categories affected by Rule 1147.

Figure 1-1



Based on permitted emissions and information provided by manufacturers, vendors and businesses, staff has calculated an emissions inventory of 3.0 to 5.2 tons of NOx per day from the equipment regulated by Rule 1147. Spray booths (≈ 3,400 units) contribute about 0.5 to 0.6 tons per day. Other types of equipment with permit limits of one pound per day or less (≈ 1,500 units) have NOx emissions totaling about 0.4 tons per day. Equipment with a potential to emit of more than one pound per day (≈ 1,500 units) contribute NOx emissions of 2.1 to 4.2 tons per day. These emission estimates are consistent with the 6.2 tons per day emission estimate developed from the 2007 AQMP for adoption of Rule 1147 in 2008.

Note that the AQMP inventory was based on fuel use and default emission factors. The 2007 AQMP inventory did not take into account lower emissions from units that met BACT emission limits. Using the midpoint of the estimated range from the above calculation for larger sources gives a total inventory estimate for all equipment of about 4.1 tons of NOx per day. This estimate is consistent with the AQMP inventory and permit information that at least one quarter of the units have burners that can comply with BACT and Rule 1147 emission limits.

In addition, staff estimates that as many as half of the units (750 out of 1,500) with a potential to emit greater than one pound per day may have actual daily NOx emissions less than a pound per day. Many of these units with actual emissions less than one pound per day have BACT and Rule 1147 compliant burners that significantly reduce their emissions. If this estimate is correct, then more than half of units with emissions greater than one pound per day of NOx (about 375) have already submitted test protocols and test results. Moreover, because of the Rule 1147 compliance schedule, most of the remaining half of the 750 units with actual emission greater than one pound per day have been permitted since the late 1990s and installed burners that comply with BACT and Rule 1147 NOx emission limits.

TECHNOLOGY ASSESSMENT

SOURCES OF INFORMATION

This report includes information from the technology assessments for Rule 1147 adoption in 2008, the rule amendment in 2011 and new information from the Rule 1147 emission testing program. This information is summarized by equipment category and by rule emission limit. The basis for the technology based emission limits in the rule are in Part D of the SCAQMD BACT Guidelines. In addition, testing performed to demonstrate compliance with SCAQMD permit limits indicated when an emission limit was achieved in practice and was used in the technology assessments for rule adoption and amendment. While the focus of this report is on equipment with NOx emissions of 1 pound per day or less, the report also includes information and analysis applicable to larger units. This information is provided in order to address stakeholder's concerns regarding the availability of technology for larger equipment.

The appendices to this report provide detailed information on affected industries, emission testing, cost effectiveness calculations, available technology and emission test results for these equipment categories. Appendix A provides a detailed summary of the equipment categories and businesses affected by Rule 1147. Appendix B of this report includes a summary of the sources of information used for rule adoption and the subsequent 2011 amendment. Appendix C provides a discussion of the SCAQMD emission test program, testing guidelines and a summary of the Rule 1147 emissions test completed. Appendices E through N provide details on the equipment, burners and emission test results for the different categories of equipment subject to Rule 1147.

In addition to information available from SCAQMD programs, this report includes recommendations from equipment and burner manufactures, affected businesses, consulting engineers and industry and business representatives. Staff conducted outreach to equipment manufacturers and product installers. Staff went into the field to identify equipment that will comply with Rule 1147 emission limits with available burners and those that may not. Rule development staff has worked with industry representatives and other staff to develop solutions to compliance challenges. These discussions resulted in a number of proposals to staff that are included in this report.

RESULTS OF THE RULE 1147 EMISSION TESTING PROGRAM

Emission testing is performed to demonstrate compliance with an emission limit. Testing companies do enough calibration, testing and calculation to prove that pollutant concentration or mass emissions are below the applicable limit. Most Rule 1147 emission test results are adjusted by the testing company or SCAQMD staff to address issues with a test's acceptable range or with other testing and calculation issues. While emission tests can demonstrate compliance with an emission limit, many test results cannot be used to accurately estimate concentrations or mass emissions from individual units and categories of equipment. However, the Rule 1147 testing program does demonstrate that burners and their control system comply with the rule emission limits.

Table 2-1 provides a summary of submitted Rule 1147 NOx emission test results that have completed SCAQMD staff review and demonstrated compliance with Rule 1147 emission limits. These test results indicate that equipment subject to Rule 1147 comply with the NOx emission limits. Table 2-1 shows the number of test results and average NOx emission concentrations for units tested at the highest and at a low firing rate if applicable. In most cases the highest firing rated tested is the normal operating condition. However, in a small number of cases the low firing rate is the normal condition. The table also indicates the applicable NOx emission limit for each category of equipment. Table 2-1 does not include results from tests that were subsequently repeated because the original test did not comply with the test method, test protocol or SCAQMD guidelines.

Table 2-1

Rule 1147 Emission Test Results

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Afterburner/ Regenerative Thermal Oxidizer	30 or 60 [2]	13	26	4	13
Afterburner/ Thermal or Catalytic Oxidizer	30 or 60 [2]	9	40	1	41
Afterburner/ Remediation Unit	60	2	23	1	24
Spray Booth (Automobile)	30	10	24		
Spray Booth (Other)	30	13	18	2	22
Crematory	60	20	50		
Dryer/Asphalt	40	1	35		
Fryer	60	7	29		
Fuel Cell Heater	30 or 60 [2]	1	11	1	9
Heated Tank	60	7	37	1	34
Metallizing Spray	30 or 60 [2]	1	22		
Metal Heat Treat	60	23	48		
Metal Melting (Large)	60	8	42	1	58
Metal Melting Pot/Crucible	60	5	54		
Multi-chamber Burn Off Oven or Furnace	30/60 or 60/60 [3]	11	42 [4]		
Multi-chamber Incinerator	30/60 or 60/60 [3]	1	54 [4]		
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		272		55	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.
[2] The emission limit depends upon the process temperature.
[3] The emission limit for the primary chamber varies depending upon process temperature.
[4] Average NOx emissions measured after the secondary chamber (afterburner).

BURNER AVAILABILITY AND FEASIBILITY TO RETROFIT UNITS

While the Rule 1147 emissions testing program indicates that the rule limits are achievable for all categories of equipment with current available technology, there is one situation where low NOx burners are not available. There is also one type of process for which staff recommends changing an emission limit based on the type of burners used in that process. In addition, there are several related categories of equipment where it is not feasible to retrofit an existing unit.

Burners for Small Ovens and Dryers

Low NOx burners are not available for very small low temperature ovens or dryers. The smallest burners produced are between 0.4 and 0.5 mmBtu per hour. If an oven requires a burner to consistently operate below about 0.3 mmBtu per hour, low NOx burners are not available to meet the 30 ppm NOx emission limit. There are smaller low NOx burners for high temperature applications that must meet an emission limit of 60 ppm. However, these applications typically require multiple burners and the total heat input exceeds 0.4 mmBtu per hour. Based on these findings, staff is considering exempting units with heat inputs less than 325,000 Btu per hour from the rule emission limit. Alternatively, the emission limit for these small oven/dryer burners could be changed to 60 ppm NOx.

Emission Limit for Burn off Ovens and Furnaces

The second category of equipment that may have difficulty meeting an emission limit of 30 ppm in low temperature applications is burn off ovens, furnaces and incinerators. Burn off ovens and furnaces melt and incinerate coatings and other materials on a product that is being recycled. This occurs in a chamber where the process temperature may be above or below 800 °F. For processes below 800 °F the NOx emission limit is 30 ppm. The incinerated materials go to a second chamber or incinerator that operates above 800 °F and has a NOx emission limit of 60 ppm.

However, the preferred type of burner for the primary incineration chamber is the same type of burner used in high temperature applications such as afterburners. These are also the same types of burners used in kilns, direct fired furnaces and crematories. These burners have been designed to comply with emission limits in the 50 to 60 ppm range. After discussions of this issue with equipment and burner manufacturers, staff is considering changing the emission limit for the primary chamber of burn off ovens, furnaces and incinerators to 60 ppm. SCAQMD staff is also considering to change the emission limit for related types of process that do not have integrated afterburners.

Heated Process Tanks, Evaporators and Parts Washers

The Rule 1147 testing program has identified three types of heating systems used in process tanks, evaporators and some parts washers that comply with the NOx emission limit. There is no information yet available for the fourth type of heating system. For all four of these systems, the burners and heat exchangers or tubes are designed as one integrated system. If an individual heated tank or evaporator system using any of systems does not comply with the emission limit, then the whole tank will have to be replaced. Exempting existing in-use units from complying the rule emission limit unless the combustion system is modified would address the issue that it is not feasible to retrofit an existing heated tank with different burners. If a tank is retrofitted with new burners, the owner will likely replace the heating tubes or heat exchanger. If the owner rebuilds a process tank, then a rule compliant system can be installed at that time.

Independent Review of Draft Technology Assessment by ETS, Inc.

An RFP was released in February 2016 to solicit proposals for an independent review of the draft technology assessment. ETS, Inc. was selected to review the Draft Technology Assessment by a panel consisting of individuals from SCAQMD, Ventura County APCD, Furnace Dynamics and the California Small Business Alliance. ETS began review of the technology assessment in June 2016 and met with the Rule 1147 Task Force to solicit comments on the draft technology assessment prepared by staff. ETS completed their review of the draft technology assessment and information provided by stakeholders in October 2016. The Rule 1147 Task Force and other stakeholders were presented the results and findings of the ETS review on November 8, 2016.

The detailed ETS review of the draft technology assessment is included in Appendix O of this report. The ETS review resulted in the following findings:

- On availability of technology to achieve rule emission limits:
  - Low Temperature Processes – Technology is available to achieve 30 ppm NOx except for burners rated less than 400,000 Btu/hour
  - High Temperature Processes – Technology is available for all sizes of burners
  - Heated Spray Booths – Technology is available for small and large Booths
- ETS agrees with staff to amend rule to address technology concerns:
  - The smallest low NOx burners available that can achieve a 30 ppm NOx limit for low temperature processes are 400,000 to 500,000 Btu/hour
  - Retrofitting heated process tanks that do not comply with the NOx limit requires replacement of the whole system
  - A 30 ppm emission limit for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators is not possible with the preferred burners
- ETS additional recommendation:
  - Recommend to change NOx emission limit for afterburner processes operating at temperatures less Than 800° F from 30 to 60 ppm

ETS's review of stakeholder comments found that where sufficient detail was made available, the cost effectiveness of examples provided by stakeholders were consistent with the findings of this technology assessment. However, much of the cost information provided was for larger equipment and not applicable to the small sources that are the subject of this assessment. In addition, for some of the examples provided, there was not sufficient detail to identify the basis of the total project costs provided to ETS. Moreover, the cost provided did not include information on installation of more efficient components and control systems that are eligible for rebates from utilities, that reduce initial project cost, and that reduce utility costs throughout the life of the rebuilt equipment.

COST AND COST EFFECTIVENESS

REVIEW OF SCAQMD COST EFFECTIVENESS ANALYSIS

There is no single cost or cost effectiveness limit established by the SCAQMD Board for use in rule development, permitting or other programs. Cost effectiveness for CARB and SCAQMD rules and programs differ and depend upon the program, the pollutant, the nature of the process and equipment affected and the types of feasible emission control options. For example, in 1993 a $15,000 per ton criteria for RECLAIM Trading Credits was adopted by the Board for the SCAQMD emission trading program to trigger additional evaluation and potential rule amendment. Adjusted to 2015 dollars using the Marshall & Swift Equipment Cost Index, that criteria would now be approximately $25,000 per ton. However, for amendment of the SOx RECLAIM program in 2010, the SCAQMD Board approved an amendment with cost effectiveness up to $60,000 per ton (adjusted to 2015 dollars).

For Rule 1147 adoption, staff estimated average cost effectiveness for replacement of different sizes of burners. Most of the burners evaluated for adoption of Rule 1147 were too large and not used by equipment subject to the rule. Those burners are only used by large equipment subject to the RECLAIM program. Most of the equipment subject to Rule 1147 requirements have heat inputs less than 4 million Btu per hour and burners used in Rule 1147 equipment are less than 2 million Btu per hour. The most common burner size in Rule 1147 equipment is 1 million Btu per hour. In the 2008 staff report, the average cost effectiveness for replacing the smallest burners with the lowest potential NOx emission reductions was about $22,400 per ton (adjusted to 2015 dollars).

For new source review under SCAQMD Regulation XIII, cost effectiveness can be included in the determination of what is best available control technology (BACT) for emission control for non-major sources. For BACT decisions affecting new sources at major facilities, cost or cost effectiveness is not included in the evaluation. However, BACT determinations for non-major (minor) sources are established by two approaches. One path evaluates technology and cost effectiveness as part of a public process to establish minor source BACT. The public process includes workshops and stakeholder input. The cost effectiveness for those decisions varies depending upon the pollutant, process and equipment involved. Note that there is one important difference in the calculation of cost effectiveness between traditional BACT analysis and rule development. For rule development, a best estimate of equipment's useful life is used in the calculation of cost effectiveness instead of a fixed 10 year assumption that is associated with financing of new equipment.

Historically, the second path used to establish minor source BACT was demonstration by a permitted unit at a non-major facility that an emission limit was "achieved in practice." If an emission limit was achieved in practice at a non-major facility, that emission limit became minor source BACT and was required by SCAQMD for applications for subsequent SCAQMD permits for similar new units regardless of the cost and cost effectiveness.

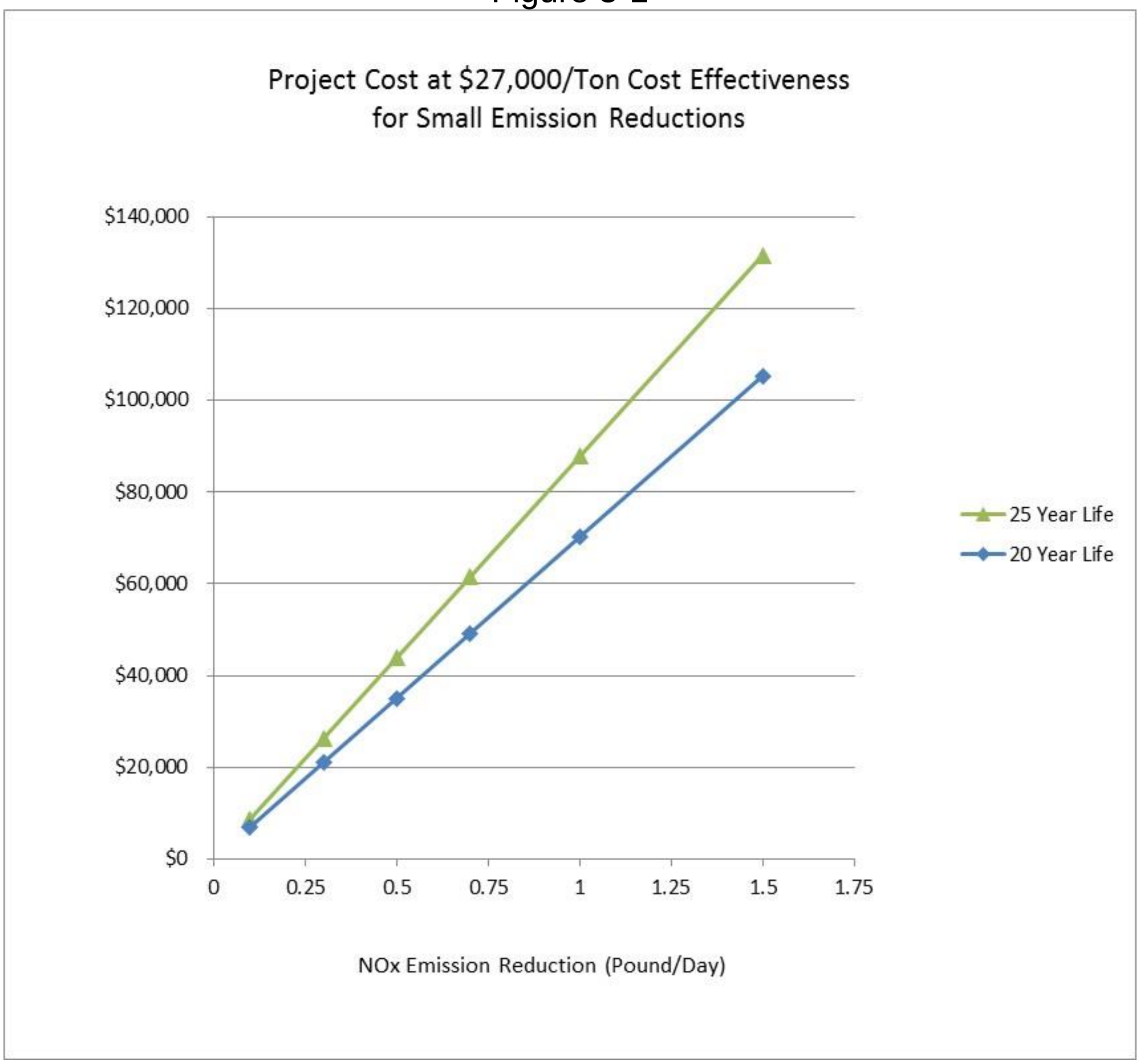
The SCAQMD has also established maximum cost effectiveness criteria in the SCAQMD BACT guidelines for sources for which there is no defined minor source BACT (Appendix

D). These cost effectiveness criteria is adjusted every calendar quarter by the Marshall & Swift Equipment Cost Index to account for changes in equipment cost. The cost effectiveness criteria for processes that do not have an established BACT is currently about \$27,000 per ton of NOx for average cost effectiveness and about \$81,000 per ton of NOx for the incremental cost effectiveness between two or more control options. The incremental cost effectiveness for Rule 1147 equipment is the difference in cost and emissions between an old natural gas burner (BACT prior to 1998) and a low NOx gas burner meeting rule emission limits. These minor source BACT criteria are appropriate for the analysis of cost effectiveness for small equipment with emissions of one pound per day or less.

SCAQMD BACT COST EFFECTIVENESS CRITERIA

The cost to retrofit equipment and the NOx emission reductions for the project can be illustrated for different cost effectiveness criteria with a graph. Figure 3-1 shows an example using small emission reductions of approximately a pound per day and project cost that results in a cost effectiveness of \$27,000/ton of NOx reduced. The cost is shown for projects with equipment lifetimes of 20 and 25 years.

Figure 3-1



For emission reductions of 0.25, 0.5 and 1 pound per day, project costs of $20,000, $40,000 and $80,000 have cost effectiveness of $27,000 per ton. Emission reductions of 0.25 to 1 pound per day bound the range of emission reductions achievable from small and low emission equipment that are the subject of this technology assessment. This equipment has NOx emissions of one pound per day or less, are exempt from the BACT requirement under new source review and have more time to comply with Rule 1147 emission limits.

DISCOUNTED CASH FLOW ANALYSIS

For calculating cost and cost effectiveness, SCAQMD BACT guidelines (Appendix D) and rule development use a discounted cash flow (DCF) analysis to estimate the cost and cost effectiveness of emission control options. The DCF method is used to calculate a net present value (NPV) of current and future expenses and savings (cash flows) from installing emission control equipment. When determining the cost and cost effectiveness of a control option, the current costs associated with the purchase and installation of equipment are added to the net current value of future costs and savings associated with operating the new equipment. In a situation where one emission control system is replacing another, the future cost and savings incorporated into the analysis are those above and beyond the cost of maintaining and operating the current equipment.

To calculate the cost effectiveness of an emission control system, the purchase, installation and operating cost of new equipment (the NPV) is divided by the emission reduction benefit of the new equipment over the operating life of the equipment. The operating life of equipment can vary from about 10 years for a residential tank type water heater to 25 or more years for residential heating furnaces, boilers, ovens, furnaces, kilns and afterburners. There is a significant number of permitted equipment including ovens, kilns, furnaces and afterburners systems operating in the SCAQMD that are 20 to 50 years old.

LEVELIZED CASH FLOW ANALYSIS

In response to recommendations from a SCAQMD sponsored review of its socioeconomic analysis conducted by Abt Associates and stakeholder comments, all current and future rule analyses will include both the DCF and levelized cast flow (LCF) estimates of costs and cost effectiveness. The cost-effectiveness values based on DCF and LCF methods are not directly comparable to each other: DCF discounts all future operation and maintenance costs to their present values whereas LCF amortizes the initial capital and installation costs over the equipment lifetime. This is why DCF values are always lower than LCF values for the exact same amount of estimated compliance cost.

EXCLUDED COSTS

Because the useful life of boilers, ovens and furnaces can be several decades, the cost of routine maintenance and equipment replacement unrelated to control equipment is not included in the cost effectiveness analysis of regulatory requirements to meet emission standards. For example, a boiler's heat exchange tubes may be replaced several times over the boiler's life. Burners and combustion control systems in boilers and other equipment must be maintained and are routinely repaired or replaced. In addition, heat treating furnaces have refractory and door seals replaced several times over the furnace's lifetime. Indirect fired heat treating furnaces also require replacement of heating tubes and may require replacement of heat shields and recirculation fans as the furnace ages. Furnace refractory, seals, tubes and heat shields may be replaced two to three times over a twenty year period. These routine maintenance and repair expenses are independent of the cost of upgrading equipment to meet emission standards.

Costs for demonstrating compliance with SCAQMD rules and regulations are excluded from cost effectiveness analyses for emission control equipment. SCAQMD BACT Guidelines, permit processing policy, and rule development process do not include the cost of demonstrating rule compliance such as source testing in the calculation of emission control equipment cost effectiveness. However, compliance demonstration costs including emissions testing, recordkeeping and other costs beyond what is recommended by equipment manufacturers are included in the socioeconomic assessment for rule adoptions.

Compliance demonstration costs are not included in a cost effectiveness analysis of new pollution control systems because all units regulated by a rule are subject to the same compliance costs. All units required to meet the Rule 1147 NOx emission limit must be tested and the owner/operator must keep maintenance and test records. A rule compliant unit that does not replace its heating system has the same compliance costs as a unit that does replace burners and other components. Moreover, costs due to compliance with other SCAQMD rules such as Regulation XIII (new source review), including BACT and emission offsets, should not be included in the calculation of cost effectiveness for emission control equipment installed to comply with Rule 1147 emission limits.

CALCULATION OF COST EFFECTIVNESS PER BURNER

The calculation of cost and cost effectiveness for Rule 1147 adoption and the 2011 amendment were done on a per burner basis. There are four reasons for this approach. First, combustion systems retrofit to comply with Rule 1147 emission limits use the same system components whether the unit has one or multiple burners. Burners, valves, and control systems will be the same for each burner. The system component that will differ is the combustion air blower (fan). Some units will use packaged burners with an integrated combustion air blower (fan) and others will use an external blower for one or multiple burners. Second, the cost per burner for a burner with its own integrated combustion air blower is higher than for a system with multiple burners and one blower. Third, most small or low emission units have only one burner and tend to use package burners with integrated combustion air blowers. Fourth, the emissions for the whole unit and per burner will be comparable whether one or multiple combustion air blowers are used. For these reasons, the cost effectiveness analysis in this document focuses on the cost and emission reduction per burner replaced utilizing the cost for a burner with an integrated blower.

COST AND COST EFFECTIVNESS OF REPLACING BURNER SYSTEMS

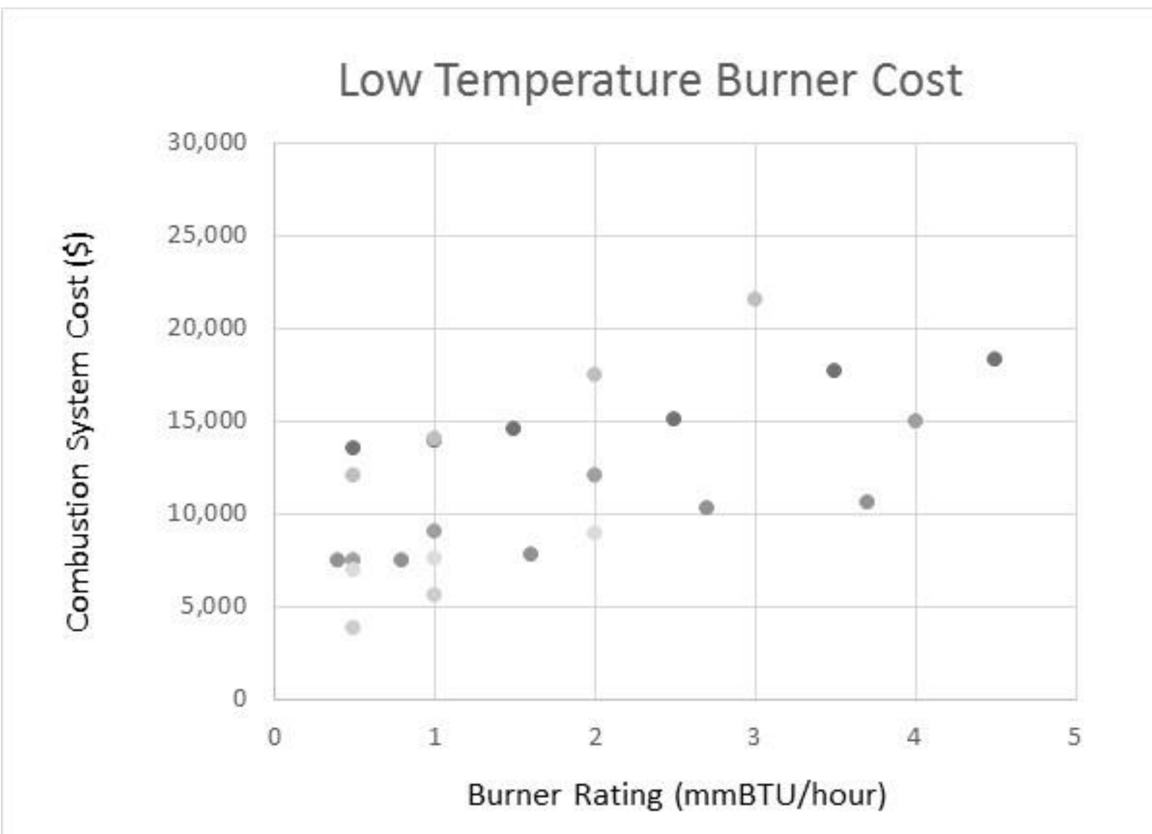
The cost of replacing burners and other combustion system components with the most commonly used low NOx burners is shown in Figures 3-2 and 3-3. Burner and combustion system replacement cost for low temperature applications that are required to comply with a 30 ppm NOx limit are displayed in Figure 3-2. Figure 3-3 shows replacement cost for high temperature applications that are required to meet a 60 ppm NOx limit. These figures include information for the most common burners from the three manufacturers that provide the majority of low NOx burners used in Rule 1147 equipment in the SCAQMD.

Burner Cost and Cost Effectiveness for Low Temperature Ovens and Dryers

Figure 3-2 summarizes information on low NOx burners and system components for low temperature operations including ovens and dryers. These costs represent a typical equipment cost to the customer and do not include tax, shipping and installation costs. The information provided is for nozzle mix burners with packaged combustion air blowers including the Eclipse Winnox and HaloFire, the Maxon Cyclomax and Ovenpak-LE and the MidCo low NOx burner.

Other types of systems can also be installed in ovens and dryers, but the cost of those alternatives are comparable to the cost of burner systems with packaged combustion air blowers. The cost for a burner with a separate combustion air blower is comparable to the cost of a packaged burner. Separate combustion air blowers are used for larger burners or where multiple burners with one blower providing combustion air to all reduces the cost of the system. Low NOx line burners are also available from Eclipse and Maxon but are more commonly used for larger systems than those that are the focus of this report. However, the cost for small line burners are comparable to the cost of the low NOx packaged burner systems shown in Figure 3-2.

Figure 3-2



Eclipse and Maxon each have two nozzle mix low NOx burner product lines for low temperature applications. Each has one system that was developed about 15 years ago (Cyclomax and Winnox) and a recently developed burner system (HaloFire and Ovenpak-LE). Maxon also has a third low NOx burner (the M-Pakt) that uses a different technology to lower NOx that is not included in this Figure but has been installed in a small number of units in the SCAQMD. The M-Pakt burner costs more than the burners included in Figure 3-2 but can achieve significantly lower NOx emissions (less than 10 ppm).

Because some replacements do not require the replacement of the fuel supply components and the control system while other retrofits require the replacement of all components, the Maxon Cyclomax and Eclipse Winnox cost in Figure 3-2 only include the cost of the burner with combustion air blower. The Eclipse HaloFire and the Maxon OvenPak-LE cost include the replacement of fuel and control systems. If a retrofit with a Winnox and Cyclomax burner requires replacement of other components including fuel and control systems, the total equipment replacement cost is comparable to the cost of purchasing a HaloFire or OvenPak-LE with all combustion system components. The MidCo low NOx burners are only sold with MidCo fuel and control system components and have two costs depending upon options requested. Replacement of a units fuel line and control system components depend upon the age of the original equipment and the replacement burner. If fuel line and control system components do not meet current building and safety codes, then they must be replaced with new components that comply with current code requirements.

The majority of the low emission equipment (1 pound/day NOx) subject to Rule 1147 have combustion systems rated less than 2 mmBtu/hour. Most use single burners rated less than 2 mmBtu/hour. The cost for installing a burner in the size range of 0.5 to 2 mmBtu/hour is a good estimate of the cost to replace combustion systems in typical low emission units. The cost of packaged burners and combustion systems of this size varies from about $5,000 to $15,000 with typical equipment costs ranging from $7,500 to $15,000.

However, to calculate total cost of replacing equipment, shipping, tax and installation costs must be added. One approach to estimate installed cost is an established EPA method that uses a multiplying factor to include sales tax and estimate shipping and installation cost. Based on the EPA method and the sales tax rate in southern California, the SCAQMD has used a factor or 1.87 times the cost of equipment to estimate installed cost. In this method, installation costs are assumed to be 50% of the equipment cost and are included in the factor. A contingency can also be included to address uncertainties in the cost estimation. For this analysis an additional 13% is added which results in an installed cost estimating factor of 2.0. Using this factor, an estimated cost for installing a low NOx burner in small ovens and dryers is approximately $30,000 [$15,000 X 2.0] but can be lower or higher depending upon the components replaced and other factors.

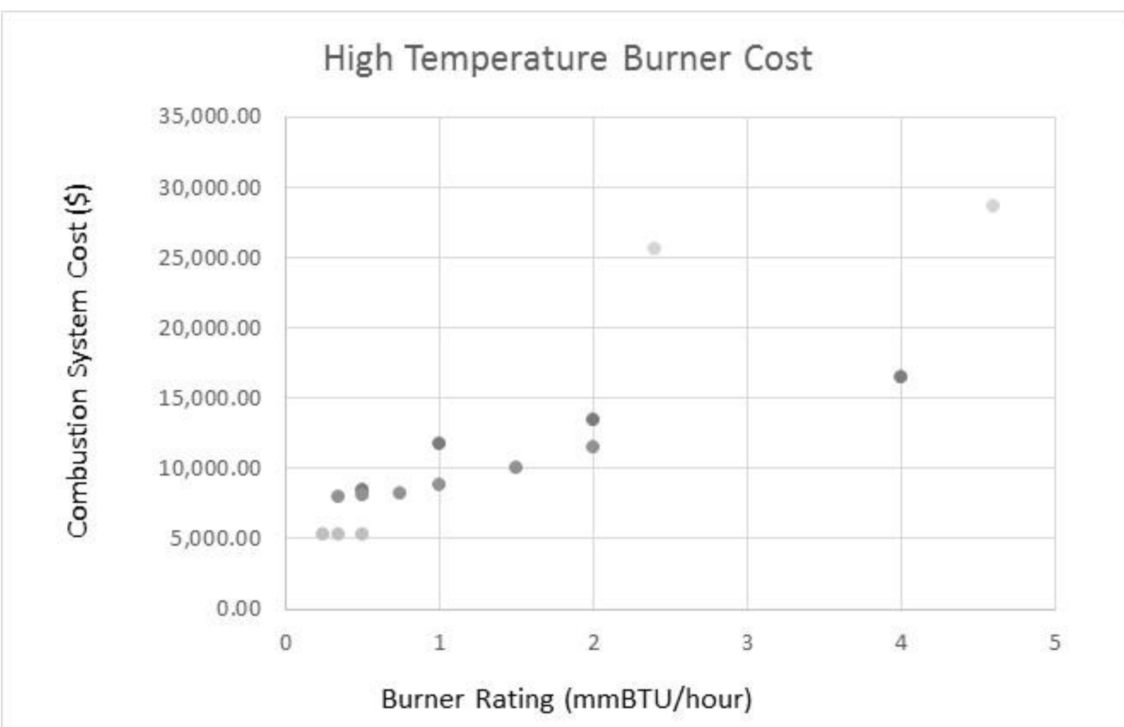
The cost effectiveness of replacing oven and dryer burners in this size range can be estimated using the NOx reductions possible from low emission units. Emission reductions of 0.25, 0.5 and 0.75 pounds per day over 260 days per year and 20 years result in a cost effectiveness of $46,154, $23,077, and $15,385 per ton for a project cost of $30,000. Since most reductions are likely in the range of 0.25 to 0.5 pounds per day, the range is best represented as $23,000 to $46,000 per ton of NOx reduced with the midpoint of this range at $34,500 per ton. This cost effectiveness to replace combustion systems for low emission ovens and dryers is greater than the SCAQMD BACT $27,000 per ton average criteria but less than the $81,000 per ton incremental criteria for minor source BACT.

In summary, the cost of replacement burners and combustion system components can vary depending upon which components must be replaced. Depending upon the age of the original installation, the burner or the entire combustion system may be replaced. In addition, installation cost can vary depending upon the particular piece of equipment and whether the equipment owner has requested additional work that is not required for compliance with Rule 1147 emission limits. Additional cost will be incurred when upgrading capacity and performing other equipment maintenance. Disregarding other costs the equipment owner may choose to include in a retrofit project, the cost effectiveness for low emission units to comply with the Rule 1147 emission limit may exceed the SCAQMD minor source BACT average criteria for NOx.

Burner Cost and Cost Effectiveness for High Temperature Applications

Figure 3-3 displays burner and combustion system costs for high temperature applications. These costs represent a typical equipment cost to the customer and do not include tax, shipping and installation costs. The three most common burners used in high temperature applications to comply with the Rule 1147 NOx emission limit of 60 ppm are the Maxon Kinedizer, the Eclipse Thermjet and Eclipse Tube Firing Burner (TFB). The Kinedizer and Thermjet are used in direct fired heating applications including metal melting, heat treating and in afterburners. The TFB is used for indirect heating applications such as heat treating. Burners from other major manufacturers including Bloom, Facultatieve, and North American/Fives have also been available for more than 15 years and were tested for Rule 1147 compliance. However, these systems were original installed burners and were not retrofits. Staff is not aware of any units that were retrofit with burners from these manufacturers in order to comply with Rule 1147.

Figure 3-3



Pot and crucible furnaces use small nozzle mix burners from a number of manufacturers. Figure 3-3 includes cost for different sizes of the Eclipse Ratio Air burner which has been installed in a small crucible furnace to comply with the Rule 1147 NOx emission limit. A Kinedizer burner has also been used to retrofit a small crucible furnace to increase capacity, reduce fuel cost and lower NOx emissions.

The cost per burner for high temperature applications is similar to the cost for low temperature applications. However, in larger metal melting and heat treating furnaces, multiple small burners are typically used to provide a more even distribution of heat in the furnace. In situations with multiple burners, the furnace is designed with one combustion air blower for all burners. However, the Eclipse Thermjet, the Ratio Air and the Maxon Kinedizer are also used in many applications requiring one burner. Consequently, the cost shown for the Thermjet, Ratio Air and Kinedizer in Figure 3-3 includes the cost of an individual combustion air blower, new fuel supply components and a new control system. In situations where multiple burners are installed with one combustion air blower and a common control panel, the cost per burner will be less. The cost for each TFB burner is based upon the cost for a system with six burners, new combustion air blower, fuel supply components and control system. The cost of the TFB burner also includes a flue gas recirculation (FGR) system for each burner that lowers NOx emissions. The FGR system is currently available for burners rated up to 0.5 mmBtu per hour.

For small high temperature applications up to 2 mmBtu per hour, the cost per burner is similar to the cost for low temperature applications and is in the range of $5,000 to $15,000. Using the EPA based multiplier factor of 2.0 to estimate installation cost for individual NOx burners in small high temperature equipment is approximately $10,000 to $30,000 but can be lower or higher depending upon the components replaced, number of burners and other factors.

Similar to the case of replacing burners in low temperature applications, the cost effectiveness of retrofitting smaller high temperature units with low NOx burners for emission reductions of 0.5 pounds per day or less may exceed the SCAQMD minor source BACT NOx average cost effectiveness criteria. For example, replacing burners at a cost of $10,000 to $30,000 per burner for an emission reduction of 0.5 pound per day per burner over 25 years gives a cost effectiveness range of $6,150 to $18,500. However, emissions are highly dependent on the size of unit and operating schedule. A reduction of 0.25 pounds per day per burner for the same cost gives a cost effectiveness range of $12,300 to $37,000 per ton. With this smaller emission reduction, the cost effectiveness may exceed the minor source BACT average cost effectiveness criteria of $27,000 per ton depending upon the cost of the burners and other components selected. For emission reductions less than 0.2 pound per day the cost effectiveness is likely to exceed the BACT average cost effectiveness criteria.

As with low temperature applications, the cost of replacing burners and combustion system components varies depending upon components replaced. Contingent upon the age of the original equipment, the burner or the entire combustion system may require replacement. Installation cost varies between equipment and locations. In addition, the equipment owner may request additional work that is not required for compliance with Rule 1147 emission limits which will increase the cost of the project.

Heating System Cost and Cost Effectiveness for Spray Booths

The cost difference to a customer between a new certified rule compliant heated spray booth and a new non-compliant unit is less than $10,000 based on information from manufacturers, vendors and the cost of booths prior to rule adoption. The cost for new units includes markups from the booth manufacturer applied to the cost of the burner, gas train and control system. Most of the specialty booths used for applications other than auto body repair were tested with standard burners, so there was no additional equipment cost to comply with Rule 1147 limits. However, the cost for adding a new natural gas fired certified heating system to an existing spray booth varies from $30,000 to $50,000 with a typical cost of about $40,000. The heating system cost varies depending upon the manufacturer, type of booth and the individual installation.

The cost of a complete new booth is highly variable depending upon the type of booth and options. According to vendor supplied information, the cost to purchase and install a new spray booth is about 20% higher than in 2008 when Rule 1147 was adopted. This increase is consistent with industry data on the cost to purchase and install new equipment (i.e., Marshall & Swift Equipment Cost Index which includes inflation, the cost of materials and manufacturing costs). The typical new installation is a semi down draft (side draft) booth for about $80,000. A new basic cross draft booth without recirculation is less and the cost of a new full down draft booth is about $115,000 and up depending upon options. Although the cost for semi down draft and down draft booths are higher than for a basic cross draft, the heating system costs are about the same for basic and premium booths from the same manufacturer or vendor.

The cost effectiveness of a new low NOx SCAQMD certified auto repair booth is at most $22,000 per ton [($10,000 at most) / (70% reduction in NOx) X (0.25 lb/day / 2000 lb/ton) X 260 days/year X 20 years)]. For higher volume shops, the cost effectiveness is lower than $22,000/ton.

The cost to retrofit a used booth to install in the SCAQMD as a new permitted unit is significantly less than purchasing a new booth. However, the cost effectiveness for retrofitting an existing permitted auto repair booth with an SCAQMD certified heating system is $88,000 per ton of NOx reduced based on a cost of $40,000 and a 20 year life. For a high volume booth used two shifts a day, the cost effectiveness could be less than half this value ($44,000/ton). For a booth retrofit costing $30,000 the cost effectiveness is $33,000 to $66,000 per ton depending upon the number of cars processed. This cost effectiveness of retrofitting an existing permitted booth is higher than the minor source average cost-effectiveness criteria of $27,000 per ton and may exceed the incremental cost effectiveness of $81,000 per ton used for equipment without a defined BACT.

Depending upon the age of a used booth, the owner may have to upgrade the booth to meet current building and safety codes. The local building and safety agency may require mechanical, electrical, fire safety and other components be upgraded or replaced. These costs are not attributable to Rule 1147 and are also not included in the cost effectiveness analysis for new, modified or relocated units that require a new SCAQMD permit.

The preceding analysis indicates the cost effectiveness for upgrading existing spray booths to comply with the Rule 1147 emission limit exceeds the minor source average cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment categories without a defined BACT and in some cases may exceed the incremental criteria of $81,000 per ton. However, the cost effectiveness for new units is at most $22,000 per ton and is less than the BACT Guidelines criteria. Because the cost effectiveness to retrofit an existing permitted booth is significantly higher than the minor source BACT criteria, staff is considering amending Rule 1147 to delay compliance for existing in-use permitted booths and heating units until they are modified, relocated or replaced. Staff is proposing that new, modified, or relocated units requiring an SCAQMD permit continue to be required to comply with the Rule 1147 NOx limit at the time of modification or installation. Currently a change of ownership in a business with an existing in-use permitted booth is exempt from the retrofit requirement unless the booth or heating unit is modified, relocated, replaced or becomes 20 years old.

EXAMPLES OF CALCULATIONS FOR SMALL SOURCES

A number of equipment replacement scenarios have been submitted to SCAQMD staff as examples of high cost effectiveness for replacing burners in some small Rule 1147 equipment. This section reevaluates some of those scenarios presented to staff. In order to accurately reflect equipment operation and regulatory requirements, the following analyses use permit application information provided by the applicant, SCAQMD permit conditions and SCAQMD BACT guidelines.

Afterburner Controlling Smoke and Odors from Smokehouse

An after burner for a smokehouse has been in operation since the 1960s. The afterburner is rated at 250,000 Btu/hour, is 50 years old and uses pipe burners. NOx emissions are more than 101 ppm (0.136 pound/million Btu). According to the equipment permit and application, the smokehouse operates 12 hours per day for three days a week and 4 hours per day two days per week. This operating schedule was confirmed by the company owner when recently questioned by an SCAQMD inspector. A permit condition requires the afterburner to operate whenever the smokehouse is in use (40 to 44 hours per week). If the current afterburner operates an average of 40 hours per week every week, NOx emissions over 25 years are 0.88 tons (0.25 mmBtu/hour X [0.136 lb/mmBtu] X [40 hour] X [52 weeks/year] X [25 years] / [2000 lb/ton]). While this operating schedule includes some holidays, it ignores second shifts and weeks when the company operates on a Saturday.

Because of the age and design of this particular afterburner, the entire unit likely needs to be replaced in order to comply with the Rule 1147 NOx emission limit. The burners in the unit are pipe burners which are pipes with holes in them. A consultant working with the company estimated that a replacement rule compliant afterburner would cost about $30,000 (equipment and installation). Staff also contacted vendors to estimate the cost of a replacement afterburner for this application. Based on vendor information, a total project cost of $30,000 is typical for a new afterburner of this size. A new rule compliant afterburner with emissions of less than 60 ppm (0.72 lb/mmBtu) would reduce emissions by at least 0.42 tons over 25 years. The estimated cost effectiveness for this emission reduction is $30,000 divided by 0.42 tons or about $71,000/ton. For this afterburner and other types of equipment with very small burners, the cost of retrofitting or replacing the unit may be higher than the minor source BACT average cost effectiveness criteria for sources without a defined BACT.

The analysis of this case presented to staff showed a much higher cost effectiveness than $71,000/ton because it assumed the afterburner operates only one hour per day. However, this afterburner must be operated at all times the oven is operating and contains smoke. This requirement is common to all emission control equipment permitted in the SCAQMD. In fact, the operator of this particular unit was cited in the past by the SCAQMD for not operating the afterburner consistent with this permit requirement.

Small Heated Process Tank or Evaporator

Many small heated process tanks and evaporators have burners, heat exchangers, and tank dimensions that are specific to each manufacturer and product line. Replacement with different burners may require replacement of the entire tank if the heat exchange system cannot be replaced. The cost for replacing the smallest process tank and heat exchange system is at minimum $30,000 to $40,000. Burners purchased separately for a new tank rated less than one mmBtu/hour may cost as much as $5,000 to $10,000. The minimum cost for a new tank with burners is about $40,000.

Most small heated tanks and evaporators operate with burners that cycle between high fire and off. A typical small system has burners in the size range of 350,000 Btu per hour (0.35 mmBtu/hour) to one million Btu per hour. NOx emissions based on a burner rating of 0.7 mmBtu/hour, a 20 year life and a default emission factor of 0.136 lb/mmBtu for natural gas are about 0.43 pounds per day or 1.1 tons over 20 years [(0.7 mmBtu/hour) X (50%) X (0.136 lb/mmBtu) X (9 hours/day) X (5 days/week) X (52 weeks/year) X (20 years)/(2000 lb/ton)]. This operating schedule does not take into account holidays but it also does not include any weeks with second shifts or operation on Saturdays. A rule compliant system (60 ppm NOx or 0.72 lb/mmBtu) would reduce NOx emission by about 0.52 tons over a 20 year period. The cost effectiveness for replacing the whole system would be about $79,000 per ton ($40,000/ 0.52 tons). The cost to retrofit or replace this type of small low emission unit may be higher than the minor source BACT average cost effectiveness criteria for sources without a defined BACT.

Burners for Generating Smoke and Heating Smokehouse Oven

A smokehouse has been in operations since the 1960s. The burner in the smokehouse is rated 35,000 Btu/hour with NOx emissions of more than 101 ppm (0.136 pound/million Btu of natural gas). Since 1990, BACT for smokehouse smoke generators is an electric heating element instead of a gas fired burner. An electric heating element costs less than $100 including tax and shipping. Electric heating elements come in a variety of shapes and sizes. If the smokehouse burner is similar to round burners used in water heaters or ranges prior to 1983, the owner could also replace the old burner with a low NOx burner (15 ppm) used in modern water heaters for about $100. The cost to install a circuit for the electric heating element or retrofit the gas burner would be about $500 for a total cost of about $600.

The burner/heating element in the smokehouse is used to heat wood chips to slowly generate smoke. It is also used to heat the smokehouse and is assumed to operate an average of two hours per day for 5 days each week. The amount of time the burner fires is determined the amount of wood chips and by the required oven temperature. The oven temperature depends upon the type of sausage produced and whether the smoked products contain sodium nitrite. Products without nitrites must be smoked at a higher temperature to kill bacteria.

For this example, the NOx emissions over 20 years are 50 pounds (0.0250 tons). The cost effectiveness for replacing the burner with a heating element or low NOx burner is at most $24,000/ton of NOx reduced ($600/0.0250 ton). If the burner or heating element operates for more than two hours per day, the cost effectiveness is lower. This example highlights that some small equipment can be retrofit to comply with Rule 1147 emission limits for low cost and reasonable cost effectiveness. Note that on adoption of Rule 1153.1 at the November 2014 Board meeting, existing smokehouses were removed from Rule 1147, included in Rule 1153.1 and are not required to comply with the rule's emission limits.

Independent Review of Cost Effectiveness by ETS, Inc.

The independent review by ETS, Inc. included a review of the cost and cost effectiveness method used in the draft technology assessment. The detailed ETS review of these elements of the draft technology assessment are included in the ETS report included in Appendix O of this document. ETS also reviewed comments provided by stakeholders. Where sufficient detail was available, ETS found that the cost effectiveness of examples provided by stakeholders were consistent with the findings of this technology assessment. However, much of the cost information provided was for larger equipment and not applicable to the small sources that are the subject of this technology assessment. In addition, for some of the examples provided, there was not sufficient detail to identify the basis of the total project costs provided to ETS. Moreover, the cost provided did not include information on installation of more efficient components and control systems that are eligible for rebates from utilities, that reduce initial project cost, and that reduce utility costs throughout the life of the rebuilt equipment. The ETS review resulted in the following findings:

- On the cost effectiveness method used by SCAQMD staff:
  - ETS agrees with method used by staff because it is consistent with EPA method used by other agencies and with method used for rule development and other district programs
- Costs used for analysis are representative of costs for equipment and installation of burner systems:
- Agree with staff proposal to amend rule to address the following concerns:
  - Replacing heating systems on existing in-use spray booths may result in a cost effectiveness higher than SCAQMD criteria used in other programs
  - Retrofitting units with daily emissions of less than 1 pound/day may result in a cost effectiveness higher than SCAQMD criteria used in other programs

RECOMMENDATIONS

RULE CHANGES UNDER CONSIDERATION

The emission testing program for Rule 1147 indicates that most equipment regulated by the rule can comply with the NOx emission limit (i.e., Table 2-1). The appendices of this report discuss the emissions test results for each category of equipment which demonstrate compliance with rule emission limits. However, low NOx combustion systems are not available for some types of small units. In addition, some categories of equipment are difficult to retrofit. Based on technical feasibility, staff is considering the following changes to Rule 1147:

- Exempt new and existing in-use units with total rated heat input of less than 325,000 Btu/hour from the Rule 1147 NOx emission limit. There are no burners in this size range for ovens and dryers that are designed to meet BACT and Rule 1147 emission limits. The smallest low NOx air heating burners designed to comply with the 30 ppm NOx limit are 400,000 to 500,000 Btu/hour (0.4 to 0.5 mmBtu/hour). If this size burner is set up to operate at less than 325,000 Btu/hour and used in an oven that requires the burner to frequently operate at heat inputs of less than 30% of its capacity, then the burner is not likely to comply with the 30 ppm emission limit. While there are burners in this size range for high temperature equipment including heat treating furnaces and kilns, these units typically use multiple small burners (four or more), have total heat ratings much greater than 325,000 Btu/hour and must comply with a 60 ppm emission limit. This change would affect an unknown number of small units regulated by Rule 1147. Based on comments received from stakeholders and consistent with the recommendations of the ETS review, staff will also consider an higher emission limit of 60 ppm NOx for small burners in low temperature applications consistent with the emissions achieved by burners in high temperature applications.

- Delay compliance with the NOx emission limit for in-use heated process tanks, evaporators and parts washers with an integrated heated tank until such time the combustion system or tank is modified. New units would be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour. Source test information on three of the four available types of heating systems for these heated process tanks can comply with the emission limits. However, if a unit does not comply with the emission limit, the entire process tank must be replaced. Staff estimates this change would affect less than 50 units subject to the Rule 1147 NOx emission limit.

- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators that operate below 800 °F. This new limit will be the same compliance limit required for higher temperatures. The burner needed for the primary chamber of these devices is not designed to achieve 30 ppm. This change would affect a small unknown number of units.

Based on cost effectiveness considerations, staff is considering the following changes to Rule 1147:

- Delay compliance with the NOx emission limit for most existing in-use spray booths until the booth or heating system is modified, relocated or replaced. Modified, relocated and new spray booths and prep stations would be required to meet the emission limit at the time of modification or installation unless the total unit heat rating is less than or equal to 325,000 Btu/hour. However, staff is considering to evaluate existing in-use operations with multiple booths and locations separately from smaller operations with one location and single booths and prep stations. The cost effectiveness for a new unit that meets the Rule 1147 NOx emission limit is at most $22,000 per ton. The cost effectiveness for retrofitting an existing unit can be as high as $88,000 per ton. This change will affect more than half of the units now subject to Rule 1147 emission limits. This will result in delays in emission reductions of 0.3 to 0.4 tons/day starting July 1, 2017. These emission reductions forgone will be reduced as new units replace old units.
- Delay compliance with the NOx emission limit for other existing in-use units with actual NOx emissions of one pound per day or less until the unit or combustion system is modified, relocated or replaced. In addition, if the unit's emissions exceed one pound per day of NOx at a later date, then the unit must comply with the NOx emission limit. Staff is considering to further evaluate operations with multiple small units whose emissions are significant. Unit emissions can be documented using gas or time meters and daily recordkeeping. The cost effectiveness for retrofitting low emission units varies considerably and can be significantly higher than the SCAQMD BACT Guidelines average cost effectiveness criteria for equipment for which BACT has not been defined. This change will affect at least one quarter of the in-use units subject to the Rule 1147 emission limit. This will result in delays of emission reductions of about 0.3 to 0.5 tons/day starting in July 1, 2017. These forgone reductions will decrease as new units replace old units.

These five changes to the rule would address infeasibility of retrofitting specific types of units and reduce cost by delaying compliance with the NOx concentration limit for units with low emissions. These changes would affect at least 4,900 permitted units of which two thirds are spray booths. In addition, up to half of the remaining 1,500 units subject to Rule 1147 may also have NOx emissions less than one pound per day which would result in compliance delays for 5,650 out of 6,400 units. These changes will result in a delay in emission reductions of 0.6 to 0.9 tons per day. However, these forgone emission reductions will be made up over 15 to 25 years as old units are replaced with new compliant units.

The independent review by ETS, Inc. resulted in a recommendation to consider for potential future rule development. ETS recommended that the emission limit for afterburner type devices operating below 800 °F should be changed from 30 to 60 ppm based on the preferred burner technology used to provide heat for these devices. SCAQMD staff agrees that this recommendation should be included in future rule development. In addition, staff is considering raising the emission limit for other processes (e.g., incinerators) that use the same type of burners at temperatures less than 800 ^{o} F. This will affect a small number of equipment regulated under Rule 1147.

REFERENCES

REFERENCES

EPA, 2002. *EPA Air Pollution Control Cost Manual, Sixth Edition* [EPA-452-02-001], United Stated Environmental Protection Agency, February 2002

SCAQMD, 2011. *Rule 1147 – NOx Reductions from Miscellaneous Sources,* South Coast Air Quality Management District, September 2011.

SCAQMD, 2008. *Rule 1147 – NOx Reductions from Miscellaneous Sources*, South Coast Air Quality Management District, December 2008.

SCAQMD, 2000. *Best Available Control Technology Guidelines Part D: BACT Guidelines for Non-Major Polluting Facilities*, South Coast Air Quality Management District (October 2000, Revised October 3, 2008)

APPENDICES

Appendix A – Summary of Rule 1147 Equipment Categories

SUMMARY OF RULE 1147 EQUIPMENT CATEGORIES

Units regulated by Rule 1147 are used in commercial, industrial, government and institutional settings and by a variety of businesses. Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the SCAQMD (NAICS 21, 23, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92).

A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, coating; printing, textile processing, material processing, and manufacturing using wood, plastics, ceramic and metal materials. A large fraction of the equipment subject to Rule 1147 heat air that is then directed to an oven or dryer in order to dry or cure materials or coatings (convective heating). In addition, most paint booths and semi-enclosed prep-stations that are used to control overspray of coatings during application also have a heat source to accelerate curing and drying of coatings. Other types of equipment heat products directly using a combination of radiant and convective heating (e.g., radiant ovens, kilns, process tanks and furnaces). Some ovens, dryers, furnaces and kilns do not use burners to provide heat and consequently are not regulated by Rule 1147. They use electric heaters, electric infrared lamps, or heat provided by a boiler or thermal fluid heater. Boilers and thermal fluid heaters are regulated by SCAQMD Rules 1146, 1146.1 and 1146.2.

In 2008 SCAQMD staff originally estimated about 6,600 pieces of equipment located at approximately 3,000 facilities would be subject to the emission limits of Rule 1147. Staff also estimated that at least 1,600 units at about 800 facilities already met the NOx emission limits of Rule1147. The remaining 2,200 facilities were expected to require retrofit of at least one unit. Staff estimated up to 2,500 permitted units with NOx emission limits greater than one pound per day and an additional 2,500 permitted units with NOx emission limits of less than one pound per day might require modifications in order to comply with the emission limits.

Based on an update of the active permitted equipment in the SCAQMD, an estimate of the number of equipment potentially subject to Rule 1147 and the fraction of units in different categories is presented in Figures A-1, A-2 and A-3 below. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

The second largest category is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the Figures A-1, A-2 and A-3.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with metallurgical processes (metal melting and heat treating) being the next largest group with approximately 300 units between the two categories. Although these categories have fewer equipment, many include equipment with significantly higher emissions.

Figure A-1

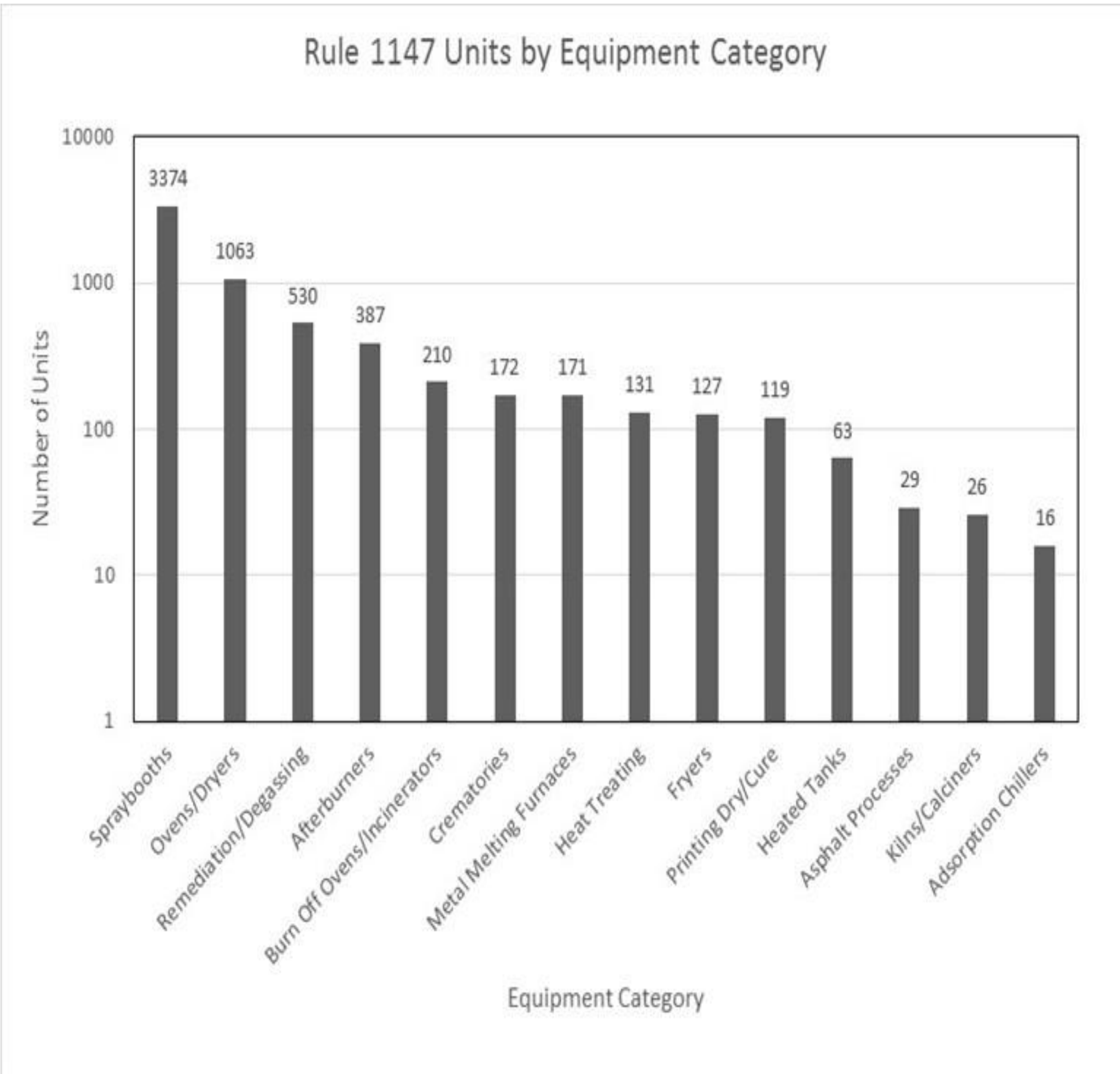


Figure A-2

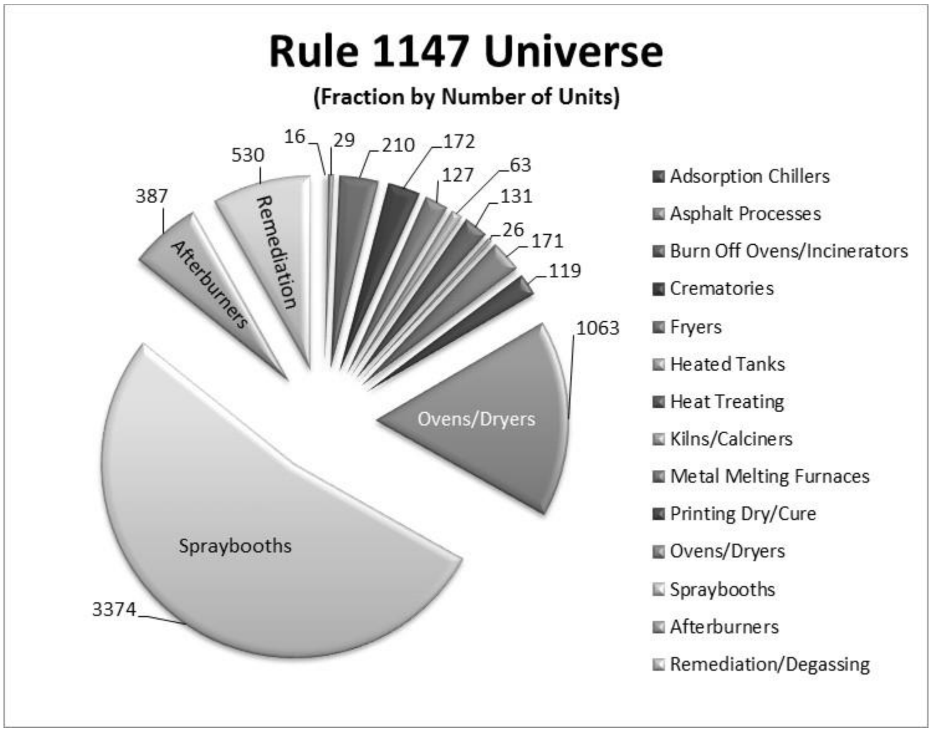
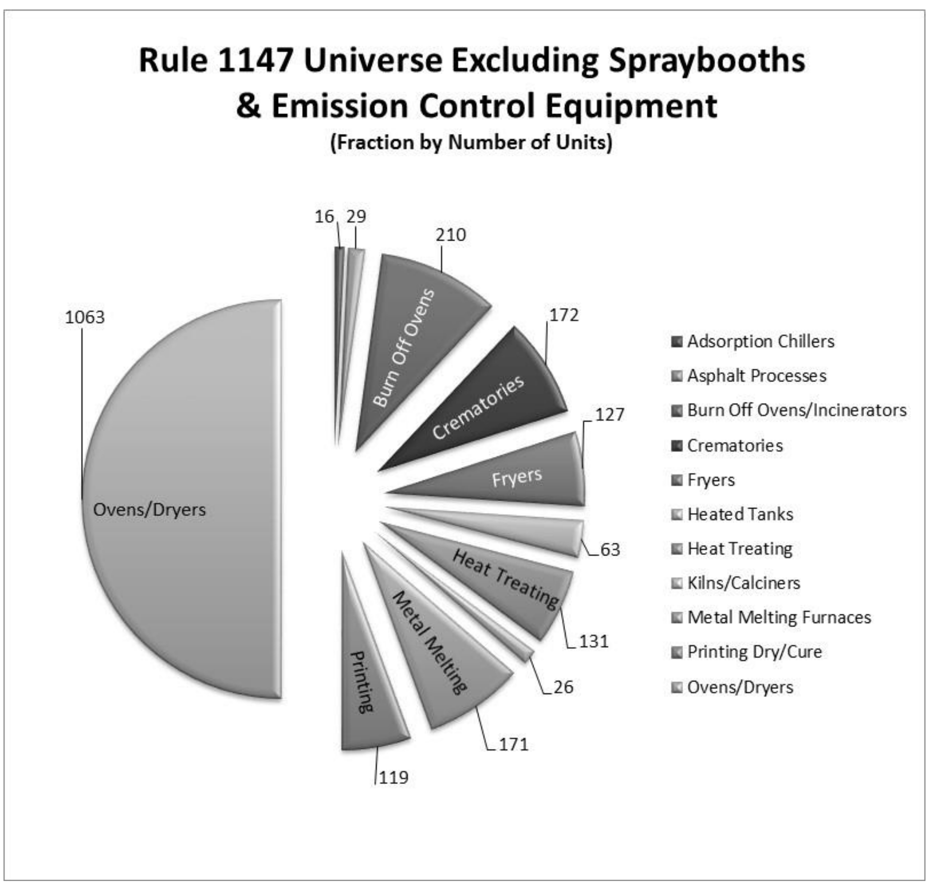


Figure A-3



The focus of this technology assessment is on smaller low emission equipment with emissions of one pound per day or less. An emission level of one pound per day is used to determine a unit's Rule 1147 compliance schedule. Units with emissions of one pound per day or less are provided up to 20 years from date of manufacture before they are required to demonstrate compliance with the NOx emission limit. Units with emissions greater than one pound per day must demonstrate compliance by the time a unit is 15 years old. New or relocated units must demonstrate compliance when they are installed. A potential to emit (PTE) of greater than one pound per day for new or relocated units also triggers the requirement to install best available control technology (BACT) under new source review (NSR) pursuant to SCAQMD Regulation XIII.

Staff has estimated the number of Rule 1147 units with NOx emissions greater than one pound per day based on a unit's PTE in the SCAQMD permit database. For spray booths and prep stations (semi-enclosed spray booths), approximately 5% (about 170) have NOx emissions greater than one pound per day. These higher emitting booths are either larger than the booths used for refinishing automobiles and light trucks or they are used in a production line at a manufacturing facility. For the remaining categories of equipment, approximately 50% have a PTE greater than one pound per day. This means approximately 1,700 units subject to Rule 1147 potentially have NOx emissions greater than one pound per day. The remaining 4,700 units have a PTE of one pound per day or less.

In previous analyses presented in rule staff reports and to the Rule 1147 Task Force, staff estimated that with the exception of spray booths at least 25% of the units in each category will comply with Rule 1147 limits without retrofitting burners. However, recent results from emissions testing of Rule 1147 units suggest that the compliance rate for units with their original burners and NOx emissions greater than one pound per day could be 50% or greater for some categories of equipment. In addition, some units with a PTE less than one pound per day have low emissions because the owner originally installed BACT compliant burners and reduced their PTE below one pound per day. New or modified sources are not required to purchase emission offsets if the average emission increase is a pound per day or less.

As an alternative to estimating emissions based on the inventory developed for the SCAQMD AQMP, total NOx emissions from equipment subject to Rule 1147 can be estimated using these units' PTE and other information. Business owners and equipment vendors indicate typical automotive booths and many other booth operations have annual average emissions of less than one third pound per day. However, up to 200 booths used in manufacturing and other applications may have emissions of a pound per day or more. Based on this information, the 3,400 permitted booths and spray stations have emissions of 0.5 to 0.6 tons NOx per day. The 1,500 other types of combustion equipment with PTE of less than or equal to a pound per day have average emissions of 0.5 pound per day per unit for a total of about 0.4 tons NOx per day. Based on this approach, the 4,700 Rule 1147 units with a PTE equal to or less than one pound per day emit about one ton of NOx per day.

The average PTE for the remaining 1,500 units is 5.6 pounds NOx per day using each units 30 day average PTE. The 30 day average PTE is calculated for a month using the weekly operating schedule but the monthly emissions are divided by 30 days instead of the number of days the equipment operates each month. Assuming these 1500 units emit at least half of their 30 day average PTE, the range for the emission estimate from the 1,500 greater than one pound per day units is from 2.1 to 4.2 tons of NOx per day. Using the range for the emission estimates calculated above provides an estimated total Rule inventory of 3.0 to 5.2 tons of NOx per day from the equipment regulated by Rule 1147. This emissions estimate is consistent with the 6.2 tons per day emission estimate developed from the 2007 AQMP for adoption of Rule 1147 in 2008.

It should be noted that the AQMP inventory was based on fuel use and default emission factors. The 2007 AQMP inventory did not take into account lower emissions from units with burners that can achieve BACT emission limits. Using the midpoint of the estimated range for larger sources gives a total inventory estimate of 4.1 tons of NOx per day for Rule 1147 equipment. This emission estimate is consistent with the AQMP inventory and permit information that at least one quarter of the units have burners that can comply with BACT and Rule 1147 emission limits.

In addition, staff estimates that as many as half of the units (750 out of 1,500) with a potential to emit greater than one pound per day may have actual daily NOx emissions less than a pound per day. If this estimate is correct, then half of the units with actual NOx emissions greater than one pound per day of NOx have already been tested (about 375) and comply with Rule 1147 emission limits. Moreover, because of the Rule 1147 compliance schedule, most of the remaining half of the 750 units are likely to have been permitted since 2000 and would have installed burners that will comply with BACT and Rule 1147 emission limits.

Appendix B – SCAQMD BACT and Test Results for Emission Limits Achieved in Practice and Used for Rule Development

SCAQMD BACT AND TEST RESULTS FOR EMISSION LIMITS ACHIEVED IN PRACTICE AND USED FOR RULE DEVELOPMENT

Rule 1147 was adopted on December 5, 2008 and amended September 9, 2011. Rule 1147 is based on two control measures from the 2007 Air Quality Management Plan (AQMP): NOx reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MSC-01). NOx emission from ovens, furnaces, kilns and afterburners had been proposed as control measure CMB-02 in the 1994 and 1997 AQMPs. Facility Modernization was a new AQMP measure that proposed equipment be upgraded to the best available control technology (BACT) available at the time the 2007 AQMP was adopted. The Facility Modernization measure is also proposed to be continued in the upcoming revision to the AQMP.

This appendix provides a summary of the NOx BACT determinations and SCAQMD permit limits achieved in practice by different types of units prior to rule adoption in 2008 and the 2011 rule amendment. The following figures were presented in rule development Task Force meetings and Rule 1147 Staff Reports for the 2008 adoption and the 2011 amendment. Figures B-1 to B-4 identify BACT determinations that were published by the SCAQMD and other air agencies prior to rule adoption. Figures B-5 and B-6 identify NOx emission limits that were achieved in practice through test results for equipment permitted prior to rule adoption. Figures B-7 and B-8 identify additional emission test results indicating NOx emission limits that were achieved in practice by permitted equipment tested in the SCAQMD prior to the 2011 rule amendment.

Figure B-1

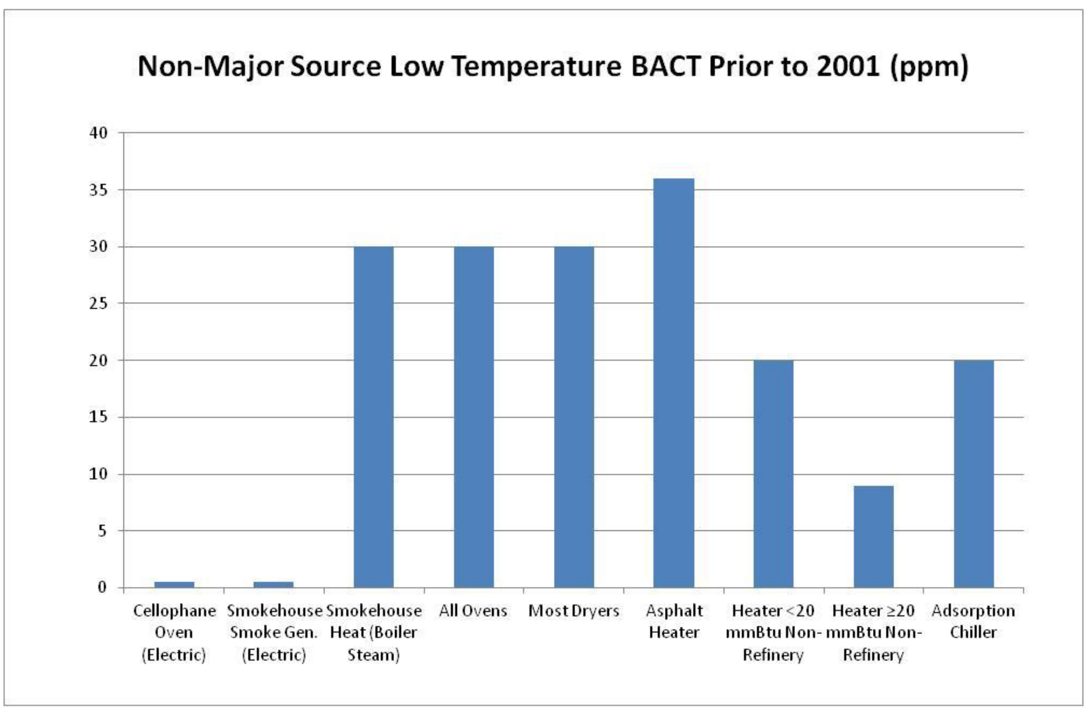


Figure B-2

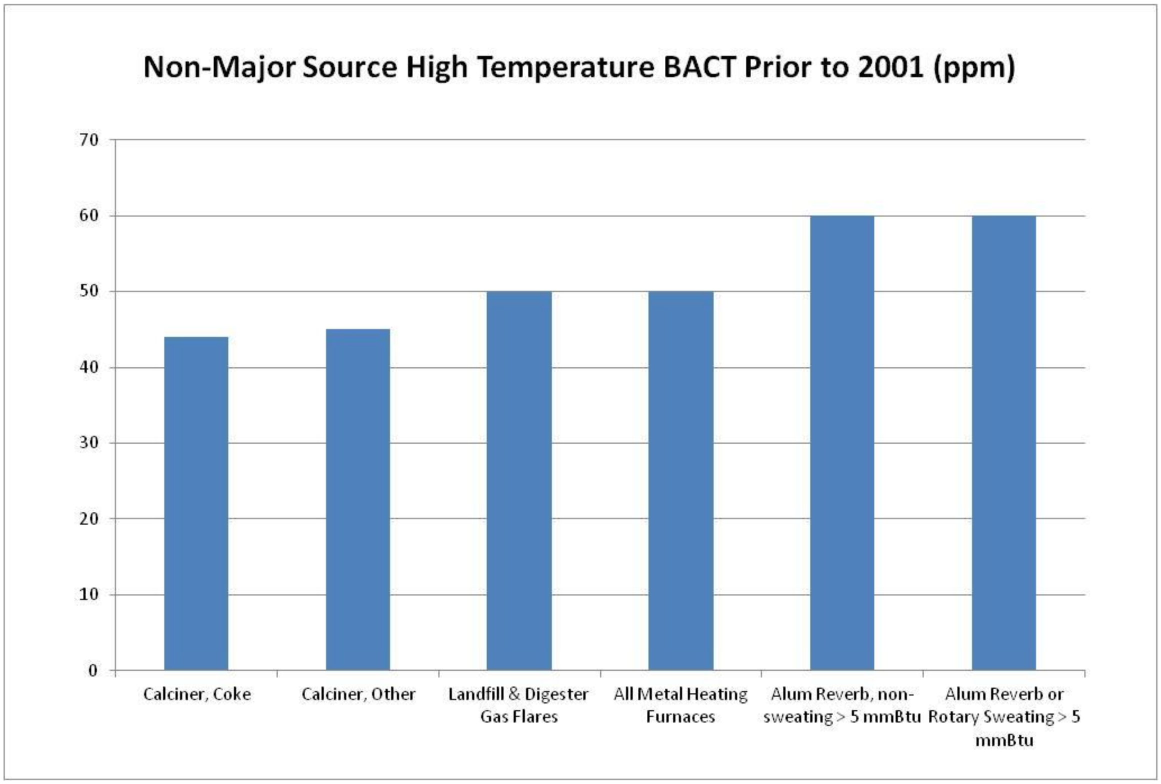


Figure B-3

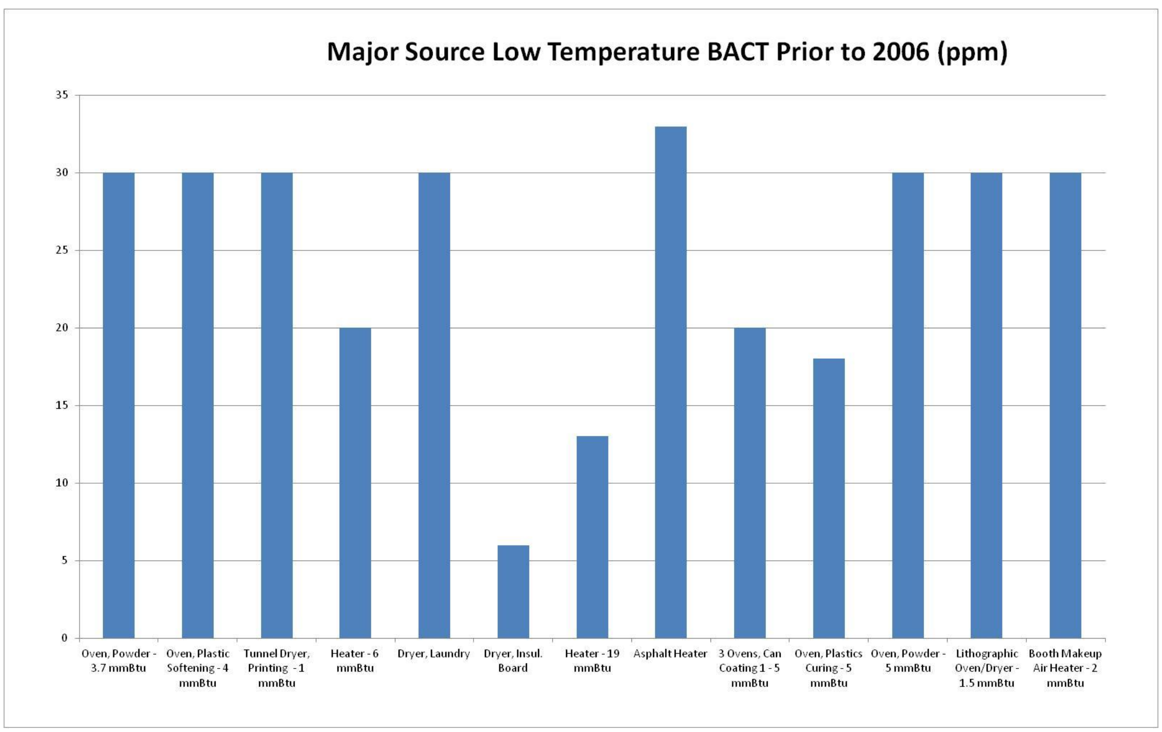


Figure B-4

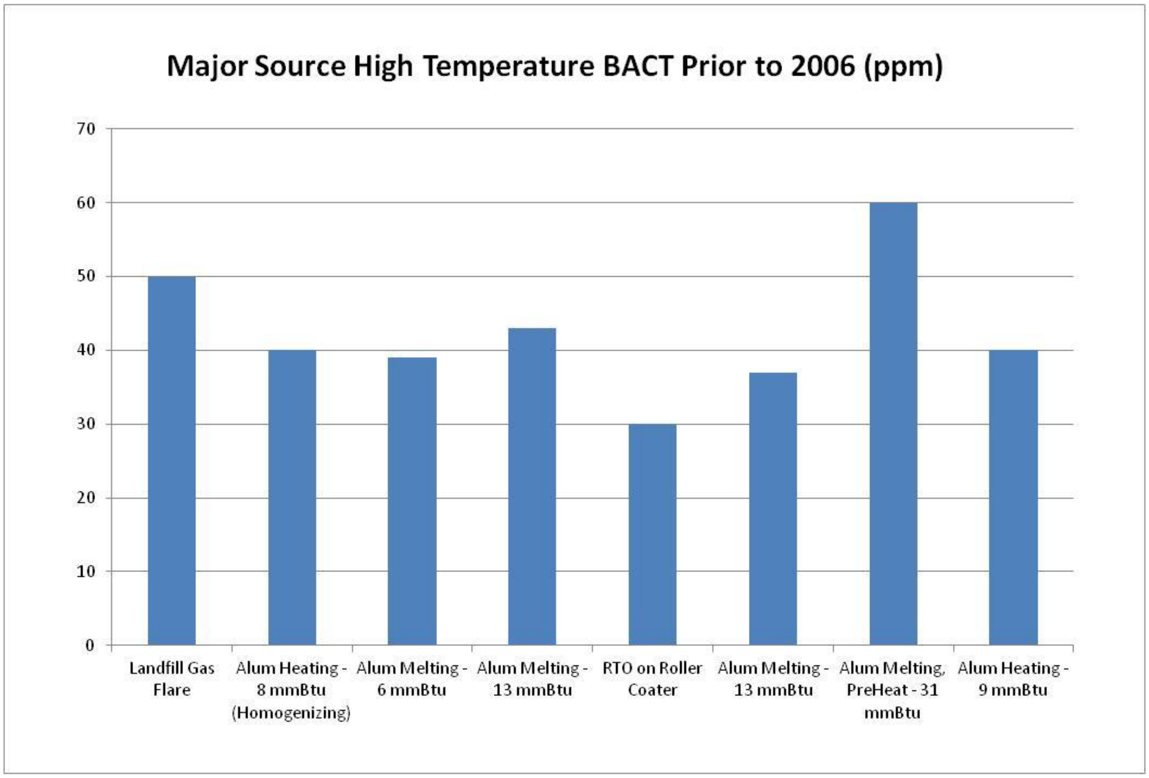


Figure B-5

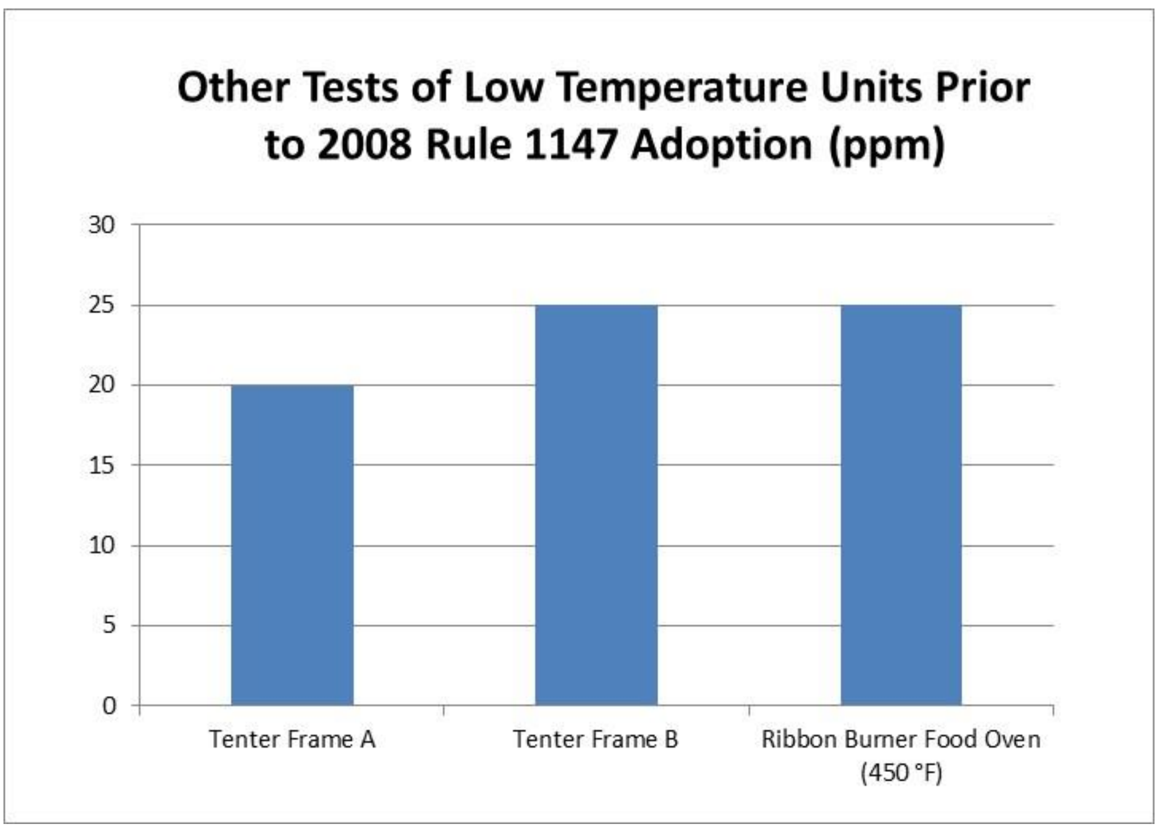


Figure B-6

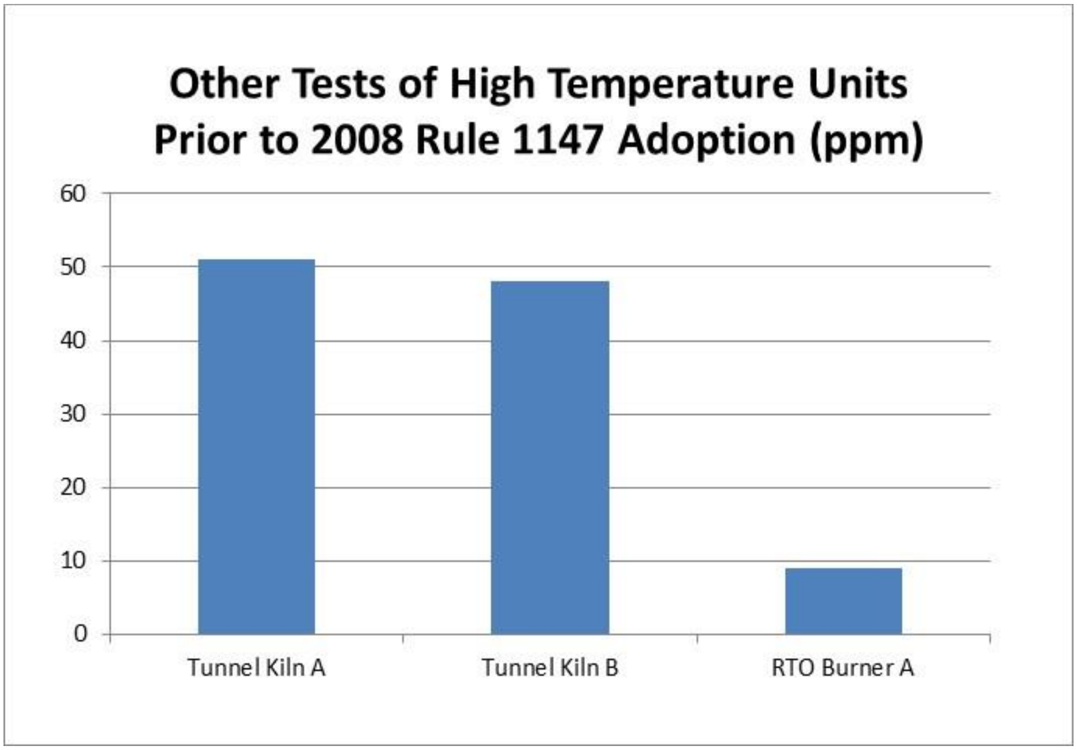


Figure B-7

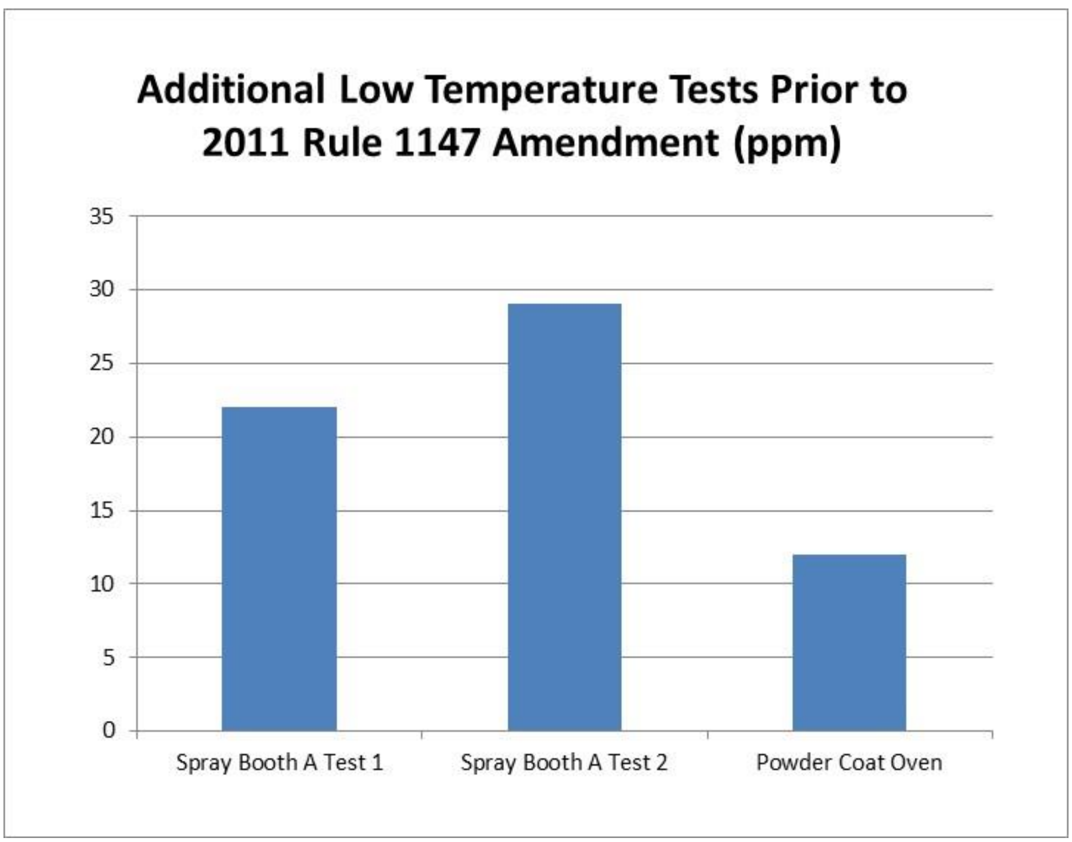
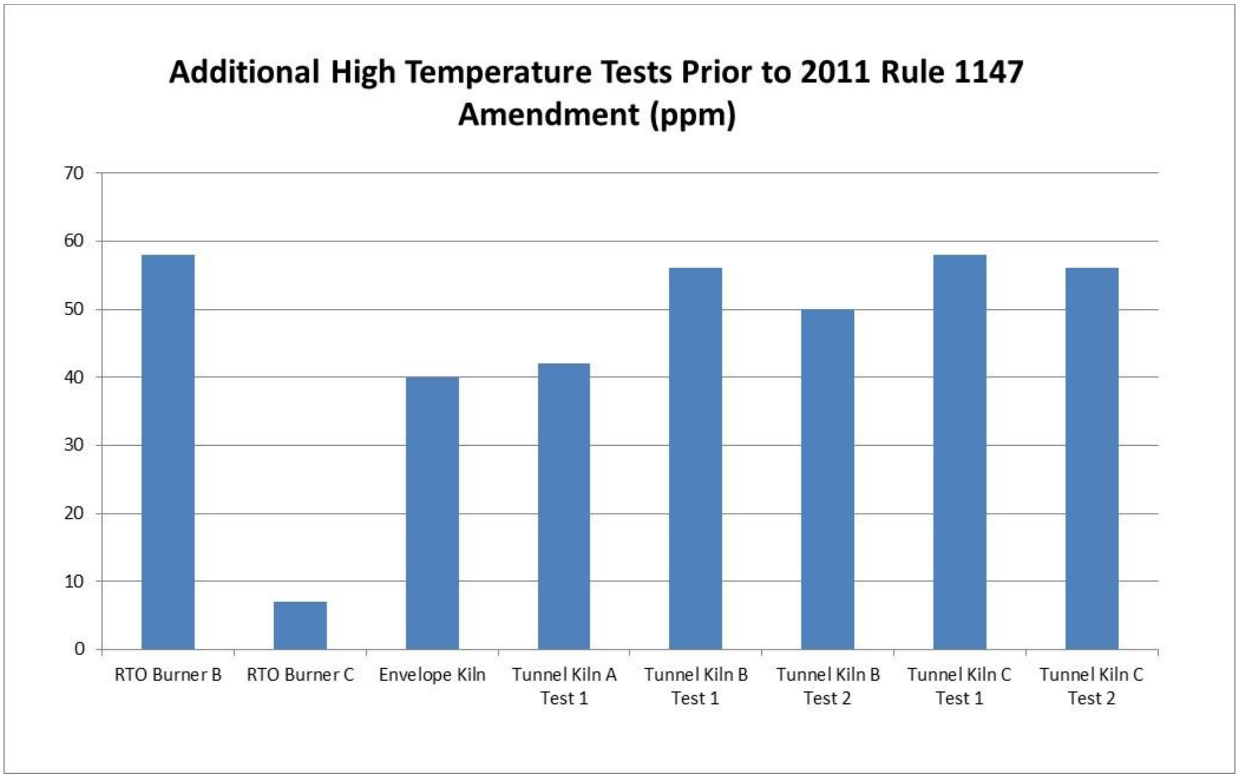


Figure B-8


Additional High Temperature Tests Prior to 2011 Rule 1147 Amendment (ppm)
70
60
50
40
30
20
10
0
RTO Burner B
RTO Burner C
Envelope Kiln
Tunnel Kiln A Test 1
Tunnel Kiln B Test 1
Tunnel Kiln B Test 2
Tunnel Kiln C Test 1
Tunnel Kiln C Test 2

Appendix C –Rule 1147 Emission Testing and Test Limitations

RULE 1147 EMISSION TESTING AND TEST LIMITATIONS

Demonstrating compliance with emission or other limits is required for Rule 1147 and all federal, state and SCAQMD air pollution regulations. In order for a new or amended SCAQMD rule to be approved for inclusion in the State Implementation Plan (SIP), test methods must be identified in the rule and approved by CARB and EPA. Rule 1147 identifies test methods that may be used to determine NOx, CO, O_2 and CO_2 concentrations and mass emissions.

In addition to EPA approved test methods, the SCAQMD also provides guidelines and generic test protocols to assist equipment owners and testing companies to prepare for and perform approvable emission tests. Because of the large variety of equipment regulated by Rule 1147, the equipment owner and the testing company must submit a test protocol and receive SCAQMD approval before testing a unit.

Emission testing can be more difficult for open direct fired units and dryers that heat large quantities of air because pollutant concentrations are diluted. Examples of these types of equipment include conveyor type ovens, textile dryers and drying ovens. Testing these units may require using a calibrated fuel meter in order to demonstrate compliance with the rule's fuel-based mass emission limit (pounds per million BTU of fuel) and additional sampling and analysis to determine carbon dioxide (CO_2) concentrations in the exhaust. CO_2 concentrations are used as an alternative to O_2 concentrations in order to adjust NOx concentrations to the Rule 1147 reference level of 3% O_2 when exhaust oxygen (O_2) concentrations are high (close to ambient levels),

The test results used for this report have been reviewed by SCAQMD Engineering, Compliance and Source Testing staff. When Rule 1147 emission testing protocols and test reports are reviewed by SCAQMD staff, they are rated as acceptable, conditionally acceptable, or unacceptable. Test reports are classified unacceptable when the report does not include all required documentation, the test was not performed consistent with the test method and approved protocol, or the test results cannot be used to demonstrate compliance with the applicable emission limit.

Tests reports are classified conditionally acceptable when the test results indicate compliance with the applicable emission limit but results are adjusted by SCAQMD staff, emissions cannot be estimated accurately but mass emissions or concentrations are equal to or less than the applicable emission limit or carbon monoxide (CO) emissions cannot be accurately determined. Rule 1147 does not include a CO emission limit because the SCAQMD is in compliance with federal and California ambient air quality standards. However, CO concentrations are routinely measured to ensure compliance with permit or facility requirements if applicable.

The most common reason for an emission test report to be rated conditionally acceptable is the reported emissions of NOx or CO have been adjusted by staff so results are consistent with SCAQMD testing and reporting guidelines. Mass emissions or concentrations may be adjusted higher or lower but the adjusted results demonstrate compliance with the rule limit.

For many test results, emissions are expressed as less than a specific concentration or mass emission rate that demonstrates compliance with the applicable emission limit. In order to be considered accurate, SCAQMD guidelines require that test results fall between 20% and 95% of the concentration of the highest concentration (high span) calibration gas used for that pollutant for that test. When results are not within the test's acceptable range, they are adjusted up to 20% of the acceptable range if they are lower, additional calibration gasses are tested to expand the range or define a lower sub-range, or the test is repeated using a different set of calibration gasses.

Adjustment up to the low end of the acceptable range (20% of the high span calibration gas) is a common result for equipment with dilute pollutant concentrations and high O_2 concentration in the unit's exhaust. Although these test results can be used to demonstrate that pollutant levels are less than a specific concentration (i.e., the low end of the acceptable range), they cannot be used to accurately estimate concentration or mass emissions. When the estimated concentrations are lower than the acceptable range of the individual test but an adjustment up to 20% of the acceptable range is still less than or equal to the applicable emission limit, the test result is satisfactory for the needs of the client and no further calibration or testing is performed by the testing company.

Test results for CO are often adjusted up to 20% of the acceptable range and because most permits do not limit CO emissions, no further analysis for CO is performed. However, when CO concentrations are adjusted up to 20% of the acceptable range, the adjusted estimated CO concentration can be up to three orders of magnitude higher than the actual concentration.

In summary, testing is performed to demonstrate compliance with an emission limit and businesses and testing companies do enough calibration, testing and calculation to prove that pollutant concentration or mass emissions are below the applicable limit. Most Rule 1147 emission test results are adjusted by the testing company or SCAQMD staff to address issues with a test's acceptable range or with other testing and calculation issues. As a result, most test results can demonstrate compliance but cannot be used to accurately estimate concentrations or mass emissions from individual units and categories of equipment.

Table C-1 provides a summary of submitted Rule 1147 NOx emission test results that have completed SCAQMD staff review and demonstrated compliance with Rule 1147 emission limits as of March 2015. Table C-1 shows the number of test results and average NOx emission concentrations for units tested at the highest and at a low firing rate if applicable. In most cases the highest firing rated tested is the normal operating condition. However, in a small number of cases the low firing rate is the normal condition. The table also indicates the applicable NOx emission limit for each category of equipment. Table C-1 does not include results from tests that were subsequently repeated because the original test did not comply with test method or SCAQMD guidelines. In addition, the table does not include test results for units that were shut down or that were withdrawn by the unit operator.

Table C-1

Rule 1147 Emission Test Results

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Afterburner/ Regenerative Thermal Oxidizer	30 or 60 [2]	13	26	4	13
Afterburner/ Thermal or Catalytic Oxidizer	30 or 60 [2]	9	40	1	41
Afterburner/ Remediation Unit	60	2	23	1	24
Spray Booth (Automobile)	30	10	24		
Spray Booth (Other)	30	13	18	2	22
Crematory	60	20	50		
Dryer/Asphalt	40	1	35		
Fryer	60	7	29		
Fuel Cell Heater	30 or 60 [2]	1	11	1	9
Heated Tank	60	7	37	1	34
Metallizing Spray	30 or 60 [2]	1	22		
Metal Heat Treat	60	23	48		
Metal Melting (Large)	60	8	42	1	58
Metal Melting Pot/Crucible	60	5	54		
Multi-chamber Burn Off Oven or Furnace	30/60 or 60/60 [3]	11	42 [4]		
Multi-chamber Incinerator	30/60 or 60/60 [3]	1	54 [4]		
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		272		55	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.

[2] The emission limit depends upon the process temperature.

[3] The emission limit for the primary chamber varies depending upon process temperature.

[4] Average NOx emissions measured after the secondary chamber (afterburner).

Appendix D – Calculation of Cost Effectiveness

CALCULATION OF COST EFFECTIVENESS

Cost effectiveness calculations for this document are performed using the methodology in SCAQMD's BACT guidelines and cost effectiveness analyses for rule development. Note that there is one key difference in the calculation of cost effectiveness between the BACT Guidelines and rule development. For rule development, a best estimate of equipment's useful life is used in the calculation of cost effectiveness instead of a fixed 10 year assumption that is associated with financing of new equipment. In addition, in rule development various emission control options are evaluated to determine the option that provides the most reductions and reasonable cost effectiveness.

For new source review (NSR) under SCAQMD Regulation XIII, equipment for which BACT is defined must meet the emission limits defined by BACT regardless of the cost. This applies to equipment at both major and non-major sources (facilities). However, for permit applications for new equipment without established BACT at non-major sources, SCAQMD staff is required to evaluate the cost effectiveness of emission reduction options. New, modified or relocated equipment with a potential to emit of one pound per day or less are not required to comply with BACT by the SCAQMD.

The cost effectiveness analysis determines which emission reduction options are below the SCAQMD Board approved maximum cost effectiveness limits established by the SCAQMD BACT committee for equipment without minor source BACT. In addition, the SCAQMD BACT guidelines and rule development are required to calculate incremental cost effectiveness for the difference in cost and emission reductions between two or more emission control options. The cost effectiveness criteria for processes that do not have an established BACT is currently about $27,000 per ton of NOx for average cost effectiveness and about $81,000 per ton of NOx for the incremental cost effectiveness between two or more control options. A copy of the section of the SCAQMD BACT Guidelines that discusses calculation of cost effectiveness is included in Attachment 1 of this appendix.

Independent Review of Cost Effectiveness by ETS, Inc.

The independent review by ETS, Inc. included a review of the cost and cost effectiveness method used in the draft technology assessment. The detailed ETS review of these elements of the draft technology assessment are included in the ETS report included in Appendix O of this document. ETS also reviewed comments provided by stakeholders. Where sufficient detail was available, ETS found that the cost effectiveness of examples provided by stakeholders were consistent with the findings of this technology assessment. However, much of the cost information provided was for larger equipment and not applicable to the small sources that are the subject of this technology assessment. In addition, for some of the examples provided, there was not sufficient detail to identify the basis of the total project costs provided to ETS. Moreover, the cost provided did not include information on installation of more efficient components and control systems that are eligible for rebates from utilities, that reduce initial project cost, and that reduce utility costs throughout the life of the rebuilt equipment. The ETS review resulted in the following findings:

- On the cost effectiveness method used by SCAQMD staff:
    - ETS agrees with method used by staff because it is consistent with the EPA method used by other agencies and with the method used for rule development and for other district programs
- Costs used for analysis are representative of costs for equipment and installation of burner systems:
- Agree with staff proposal to amend rule to address the following concerns:
    - Replacing heating systems on existing in-use spray booths may result in a cost effectiveness higher than SCAQMD criteria used in other programs
    - Retrofitting units with daily emissions of less than 1 pound/day may result in a cost effectiveness higher than SCAQMD criteria used in other programs

Attachment 1 of Appendix D – Cost Effectiveness Methodology from Part C: Policy and Procedures for Non-Major Polluting Facilities of July 2006 SCAQMD Best Available Control Technology Guidelines

Attachment 1

Cost Effectiveness Methodology

Cost effectiveness is measured in terms of control costs (dollars) per air emissions reduced (tons). If the cost per ton of emissions reduced is less than the maximum required cost effectiveness, then the control method is considered to be cost effective. This section also discusses the updated maximum cost effectiveness values, and those costs, which can be included in the cost effectiveness evaluation.

There are two types of cost effectiveness: average and incremental. Average cost effectiveness considers the difference in cost and emissions between a proposed MSBACT and an uncontrolled case. On the other hand, incremental cost effectiveness looks at the difference in cost and emissions between the proposed MSBACT and alternative control options.

Applicants may also conduct a cost effectiveness evaluation to support their case for the special permit considerations discussed in Chapter 2.

Discounted Cash Flow Method

The discounted cash flow method (DCF) is used in the MSBACT Guidelines. This is also the method used in the 1999 Air Quality Management Plan. The DCF method calculates the present value of the control costs over the life of the equipment by adding the capital cost to the present value of all annual costs and other periodic costs over the life of the equipment. A real interest rate* of four percent, and a 10-year equipment life is used. The cost effectiveness is determined by dividing the total present value of the control costs by the total emission reductions in tons over the same 10-year equipment life.

Maximum Cost Effectiveness Values

The MSBACT maximum cost effectiveness values, shown in Table 4, are based on a DCF analysis with a 4% real interest rate.

Table 4: Maximum Cost Effectiveness Criteria (Second Quarter 2003)

Pollutant	Average (Maximum $ per Ton)	Incremental (Maximum $ per Ton)
ROG	20,200	60,600
NOx	19,100	57,200
SOx	10,100	30,300
PM_{10}	4,500	13,400
CO	400	1,150

The cost criteria [in Table 4] are based on those adopted by the AQMD Governing Board in the 1995 BACT Guidelines, adjusted to second quarter 2003 dollars using the Marshall and Swift Equipment Cost Index. Cost effectiveness analyses should use these figures adjusted to the latest Marshall and Swift Equipment Cost Index, which is published monthly in Chemical Engineering.

* The real interest rate is the difference between market interest rates and inflation, which typically remains constant at four percent.

Top Down Cost Methodology

The AQMD uses the top down approach for evaluating cost effectiveness. This means that the best control method, with the highest emission reduction, is first analyzed. If it is not cost effective, then the second-best control method is evaluated for cost effectiveness. The process continues until a control method is found to be cost-effective.

AQMD staff will calculate both incremental and average cost effectiveness. The new MSBACT must be cost effective based on both analyses.

Costs to Include in a Cost Effectiveness Analysis

Cost effectiveness evaluations consider both capital and operating costs. Capital cost includes not only the price of the equipment, but the cost for shipping, engineering and installation. Operating or annual costs include expenditures associated with utilities, labor and replacement costs. Finally, costs are reduced if any of the materials or energy created by the process result in cost savings. These cost items are shown in Table 5. Methodologies for determining these values are given in documents prepared by USEPA through their Office of Air Quality Planning and Standards (OAQPS Control Cost Manual, 4th Edition, USEPA 450/3-90-006 and Supplements).

The cost of land will not be considered because 1) add-on control equipment usually takes up very little space, 2) add-on control equipment does not usually require the purchase of additional land, and 3) land is non-depreciable and has value at the end of the project. In addition, the cost of controlling secondary emissions and cross-media pollutants caused by the primary MSBACT requirement should be included in any required cost effectiveness evaluation of the primary MSBACT requirement.

Table 5: Cost Factors

Total Capital Investment

Purchased Equipment Cost	Indirect Installation Costs
Control Device	Engineering
Ancillary (including duct work)	Construction and Field Expenses
Instrumentation	Start-Up
Taxes	Performance Tests
Freight	Contingencies
Direct Installation Cost	
Foundations and Supports	
Handling and Erection	
Electrical	
Piping	
Insulation	
Painting	

Total Annual Cost

Direct Costs
- Raw Materials
- Utilities
  - Electricity
  - Fuel
  - Steam
  - Water
  - Compressed Air
- Waste Treatment/Disposal
- Labor
  - Operating
  - Supervisory
  - Maintenance
- Maintenance Materials
- Replacement Parts

Indirect Costs
- Overhead
- Property Taxes
- Insurance
- Administrative Charges

Recovery Credits
- Materials
- Energy

Appendix E – Afterburner Technologies

AFTERBURNER TECHNOLOGIES

The afterburner category is comprised of a variety of technologies that are used to capture and incinerate VOCs, PM and toxic air contaminants. These include direct flame afterburners (often called an oxidizer or incinerator), regenerative thermal oxidizers (RTO) that heat a ceramic bed which oxidizes pollutants, and catalytic oxidizers which incinerate pollutants with the help of a catalytic matrix. Remediation systems for removing contaminants from soil or groundwater also use the same types of technologies to incinerate VOCs or toxic air contaminants.

Alternative non-combustion technologies for control of VOC, PM and toxic air pollutants are also available and include electrostatic precipitation, wet or dry scrubbers, carbon adsorption, and other filter media. Remediation systems and some other types of units may combine carbon adsorption or other technologies with a direct flame, catalytic or regenerative thermal oxidizer. An afterburner or oxidizer can also be as simple as a stack with a burner and pilot flame (i.e., a flare).

At the time of rule development, two sources of information were available to identify BACT for this category of equipment. BACT determinations had been made for flare based oxidizers. These determinations established a BACT/LAER limit for non-major and major sources of 50 ppm NOx. However, there were a significant number of flare based oxidizers that had been permitted with a 60 ppm NOx limit prior to that BACT determination. In addition, emission test results that varied across a range from below 30 ppm up to about 50 ppm NOx for new catalytic and regenerative thermal oxidizer systems were being used by the SCAQMD permitting group as the basis to require new applicants to meet equivalent emission limits. Given the variety of processes used as afterburners, their different emission characteristics and older equipment permitted at emission levels close to but above some current BACT levels, a rule NOx limit of 60 ppm was proposed for this category of equipment and adopted in Rule 1147.

Depending upon the type of afterburner system, different burners are used. Most of the RTOs tested use a high temperature Maxon Kinedizer burner but one uses an air heating burner from Eclipse – the Winnox burner. A Kinedizer burner is also used in a remediation unit that incorporates an RTO. Thermal and catalytic oxidizers use a variety of burners from Maxon, MidCo, Eclipse, and others. Some of these units use air heating burners and others use higher temperature burners such as the Eclipse Thermjet. A variety of burners are also used in remediation units that incorporate a thermal or catalytic oxidizer.

Newer flare based systems incorporate low NOx burners that can meet the 60 ppm NOx limit (e.g., John Zink and Flare Industries/Bekaert). However, RTO based systems offer a significant advantage over direct flame systems because they can significantly reduce fuel consumption and the cost of operating the system. Staff is aware of one facility that replaced an old flare based oxidizer with a new RTO in order to meet the Rule 1147 emission limit and to reduce fuel cost.

The afterburners that have been tested are used to control emissions from a wide variety of processes. Afterburners are widely used to control emissions of VOCs and PM from printing, coating and chemical manufacturing operations. Afterburners are also used for the control of VOCs from food bakery ovens and fryers. Larger coffee roasters are required to use afterburners to control emissions of PM, toxics and for odor control. One tested unit controls emission of PM from an animal feed dryer. Several of the tested units are portable and are used to control emissions of VOCs from degassing of storage tanks, pipelines and other equipment.

The 24 units tested easily passed the 60 ppm NOx limit. Most of the units were tested with their original burners. The RTO and remediation units have average NOx emissions of about 25 ppm at high fire with a range of 16 to 55 ppm. One unit with emissions of 55 ppm NOx has a Maxon Kinemax burner instead of a Kinedizer. Thermal and catalytic oxidizers averaged about 40 ppm NOx with a range of 21 to 54 ppm at high fire. Units with air heating burners including the Eclipse Winnox have lower emissions than units with high temperature burners such as the Eclipse Thermjet.

A large number of afterburner units using different combustion technologies have been tested and comply with the Rule 1147 NOx emission limit of 60 ppm. Most of the units complied with the emission limit using their original burners. The emission vary depending upon the combustion technology. However, all of the units for which tests were submitted and reviewed comply with the rule emission limit.

Because the preferred burner type for afterburner applications cannot easily meet the 30 ppm NOx emission limit in processes operating at temperatures less than 800° F, the independent reviewer of the draft technology assessment (ETS) recommended changing the limit to 60 ppm. Staff agrees with this recommendation. In addition, staff is considering raising the emission limit for other processes (e.g., incinerators) that use the same type of burners at temperatures less than 800 ° F. This will affect a small number of equipment regulated under Rule 1147.

Appendix F – Spray Booths

SPRAY BOOTHS

A variety of coating operations use heated spray booths and prep stations. Prep stations are paint booths that are not fully enclosed. The majority of heated spray booths in the SCAQMD are auto body refinishing booths used for refinishing passenger cars and light trucks. Larger booths are used for industrial coating operations, large trucks and trailers and a variety of maintenance applications. In addition, auto body type spray booths are also used by manufacturing operations for drying and curing components and assembled products. An achieved in practice LAER/BACT limit of 30 ppm NOx for makeup air heaters in spray booth applications and the fact that many SCAQMD permitted booths are used as curing or drying ovens in manufacturing operations justified a Rule 1147 NOx limit of 30 ppm. It should be noted that BACT for ovens and most dryers has been 30 ppm NOx since 1998.

To date, only new or relocated spray booths have been subject to the Rule 1147 emission limit. Because more than 90% of in-use heated booths are estimated to have annual average emissions less than one pound per day of NOx, existing units are not subject to the emission limit until on or July 1, 2017. Most of the new booths have been installed in the SCAQMD are for auto body repair and have been permitted based on certification of the burner and related components of the makeup air unit for the booth.

Auto body repair businesses use paint booths for reducing the amount of spray leaving the facility and keeping dust off newly painted surfaces. In addition, booths speed up the drying process by moving air through the booth. Spray booths can also be fitted with heating units that further accelerate the drying and curing of coatings.

Auto body repair businesses use heated booths in order to increase the number of painted cars that can be dried in a day. Businesses that coat four or more cars a day use heated booths. About three painted cars can be dried each day with an unheated booth. According to spray booth vendors, the average number of cars dried per day in a spray booth is about five. The maximum number of cars that can be processed by a heated booth during one shift is eight. Some auto body repair businesses operate more than one shift per day thus increasing the number of cars processed.

Technology

Ten booths used in auto body repair from a variety of manufacturers have been tested as part of the process to certify a company's spray booth heating systems. These certified units comply with the Rule 1147 emission limit of 30 ppm NOx and with workplace exposure standards for CO. To date, all of the certified spray booths have used a burner system from MidCo. This new low NOx burner replaced line burners in a number of booth manufacturers heating units. Many of the previous units were built around a MidCo line burner. Since 2010, more than 125 low NOx heating systems based on the MidCo low NOx burner have been installed in the SCAQMD. The majority of these have been installed in heating units for new auto body spray booths.

Several spray booth manufacturers have taken advantage of the option to certify their booths and heating system. Certified models do not require individual emission tests. Currently there are 32 models of booths and heating systems from eight manufacturers certified compliant with the Rule 1147 emission limit. Non-certified models must perform individual tests in order to receive an SCAQMD permit. The SCAQMD certified systems vary from basic cross flow booths to down flow booths constructed with below ground air exhaust systems. The manufacturers represent a significant portion of the industry and include companies that manufacture their booths and heating systems in California.

The SCAQMD permitting group certifies the whole spray booth mechanical system including the combustion components. This approach significantly increases the cost of retrofitting existing spray booths with certified low NOx burners. To use an SCAQMD certified burner on a used spray booth, the owner/operator must also install a new heater box, blower, other mechanical components with a new thermostat and control system for moving air in addition to installing the burner, mounting hardware and combustion control system.

Other manufacturers have decided not to certify their heating units, but instead have decided to have their distributors and local installers test each new installation. For example, three auto body booths at one location have been tested and complied with the Rule 1147 NOx limit using a newer design line burner from Maxon.

Other types of booths and some auto body booths used for different applications have also been tested and comply with the Rule 1147 emissions limit. These units submitted individual emission test results. Thirteen test results have been submitted for booths that are not used for auto body repair. These booths use heating units or burners from Hastings, MidCo, PowerFlame, and Riello. In these cases, the air movement system and other components were not required to be replaced by the SCAQMD.

The burners in these other booths use a variety of technologies to achieve the emission limit of 30 ppm. The heater manufactured by Hastings is a roof mounted unit that can also be used to heat other processes or large building spaces such as a warehouse. All of the burners in these systems use premixing of air and fuel with a controlled amount of excess air to reduce emissions. The MidCo burner uses a knit steel fabric material to stabilize and spread the flame over a larger surface area to reduce peak flame temperature and NOx emissions. The Hastings, PowerFlame and Riello burners use premixing, swirl for mixing with air in the combustion zone and other technologies to keep emissions low. The new control systems for these low NOx burners can be the most important component of the system because they provide more precise tuning and control of the combustion process across the firing range of the burner.

Cost Effectiveness of Rule Compliant Spray Booth Heating Systems

NOx Emissions for most auto body spray booths average less than on half pound per day on an annual basis. NOx emissions contribute to the formation of secondary particulates in addition to ozone. A typical booths' annual average NOx emissions are less than one third pound per day. However, during late fall and winter when PM 2.5 concentrations can be high, daily NOx emissions can be two to three times annual average emissions.

The cost difference between a new certified rule compliant heated spray booth and a new non-compliant unit is less than $10,000 on typical new booth based on information from manufacturers, vendors and the cost of booths prior to rule adoption. The cost for new units includes markups from the booth manufacturer applied to the cost of the burner, gas train and control system. Most of the specialty booths used for applications other than auto body repair were tested with standard burners, so there was no additional equipment cost to comply with Rule 1147 limits. However, the cost for adding a new natural gas fired certified heating system to an existing spray booth varies from $30,000 to $50,000 with a typical cost of about $40,000. The cost varies depending upon the manufacturer, type of booth and the individual installation.

The cost of new booths are highly variable depending upon the type of booth and options. According to vendor supplied information, the cost to purchase and install a new spray booth is about 20% higher than in 2008 when Rule 1147 was adopted. This increase is consistent with industry data on the cost to purchase and install new equipment (i.e., Marshall & Swift Equipment Cost Index which includes inflation, the cost of materials and manufacturing costs). The typical new installation is a semi down draft (side draft) booth with for about $80,000. A new basic cross draft booth without recirculation is less and costs $65,000 to $80,000. However, some vendors do not sell heated cross flow booths. The heating system and installation cost of the booth and heating constitute most of the cost for a new basic cross draft booth. A new full down draft booth is about $115,000 and up depending upon options. Although the cost for semi down draft and down draft booths are higher than for a basic cross draft, the heating system costs are about the same for basic and premium booths from the same manufacturer or vendor.

The cost effectiveness for a new SCAQMD certified low NOx auto repair booth is at most $22,000 per ton [($10,000 at most) / (70% reduction in NOx) X (0.25 lb/day / 2000 lb/ton) X 260 days/year X 20 years)]. In higher volume shops, the cost effectiveness is better (lower than $22,000/ton).

The cost to retrofit a used booth to install in the SCAQMD as a new permitted unit is significantly less than purchasing a new booth. However, the cost effectiveness for retrofitting an existing in-use auto repair booth with a SCAQMD certified heating system is $88,000 per ton of NOx reduced based on a cost of $40,000 and a 20 year life. The cost of the heating system ranges from $30,000 to $50,000. For a high volume booth used two shifts a day, the cost effectiveness could be less than half this value ($44,000/ton). For a booth retrofit costing $30,000 the cost effectiveness is $66,000 per ton. This cost effectiveness of retrofitting an existing permitted booth is higher than the minor source average cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment without defined BACT. Depending upon the number of cars processed per day, the retrofit cost effectiveness may also be higher than the BACT incremental cost effectiveness criteria of $81,000 per ton.

It must be noted that depending upon the age of the used booth, the owner may have to upgrade the booth to meet current building and safety codes. The local building and safety agency may require mechanical, electrical, fire safety and other components be upgraded or replaced. These costs are not attributable to Rule 1147 and are also not included in the cost effectiveness analysis for new, modified or relocated units that require a new SCAQMD permit. The SCAQMD BACT Guidelines does not include the cost of compliance with non SCAQMD regulations in the calculation of cost effectiveness. The calculation of cost effectiveness is an analysis of the cost of new equipment and the cost of operating the new equipment. In the cost effectiveness analysis for new rule requirements, the recurring costs for new or modified equipment are those above and beyond the costs associated with original existing equipment.

The cost effectiveness for upgrading existing spray booths to comply with the Rule 1147 emission limit exceeds the minor source cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment categories without a defined BACT. However, the cost effectiveness for new units is at most $22,000 per ton and is less than the BACT Guidelines criteria. Because the cost effectiveness to retrofit an existing permitted booth is significantly higher than the minor source BACT criteria, staff is considering amending Rule 1147 to delay compliance for existing in-use permitted booths and heating units until they are modified (modification of the combustion or air circulation system), relocated (including moved to a different location within the facility) or replaced. Staff is proposing that new, modified, or relocated units requiring an SCAQMD permit continue to be required to comply with the Rule 1147 NOx limit at the time of modification or installation. A change of ownership in a business with an existing in-use permitted booth would be exempt from the retrofit requirement unless the booth or heating unit is modified, relocated or replaced.

Appendix G – Crematories

CREMATORIES

Twenty crematories have been tested and comply with the Rule 1147 NOx emission limit. This list includes units tested with their original burners and units tested after replacing their burners. The burners tested in these units are manufactured by Eclipse, Facultatieve and others. The most common burner installed for new units in the SCAQMD and for replacing old burners is the Eclipse Thermjet, a medium to high velocity burner used in many high temperature applications including kilns, metal melting, heat treating and burn off furnaces.

Crematories are constructed as two integrated chambers each with their own burners. The first chamber is used for incineration and the second is an afterburner for reducing emissions of PM, VOCs and odors. Typically both chambers use the same type of high temperature burner but the size and number of burners in each chamber may differ. The primary chamber typically has one or two smaller burners than the one burner used in the secondary chamber afterburner section.

The Rule 1147 NOx emission limit for crematories is 60 ppm. The NOx emission concentrations for the tested crematories average 50 ppm with a range from 30 to 59 ppm. The 20 crematory tests that have been reviewed and comply with the emission limit include those with original burners and many units with new burners and control systems. Many crematories more than 20 years old had burners that are no longer produced and would not comply with the Rule 1147 emission limit. However, those crematories replaced their burners and comply with the 60 ppm NOx emission limit. Most crematories less than 20 years old have been installed with burners that comply with the Rule 1147 NOx emission limit and will not require replacement a retrofit. These units will only be required to demonstrate compliance through an emissions test.

The Rule 1147 test program has demonstrated that the NOx emission limit of 60 ppm is achieved by the burners and combustion control system available since the late 1990s. Crematories that have had their burners replaced use the same burners that are installed in new units. The average emission concentration from the tested units is 50 ppm and some units are significantly lower.

Appendix H – Fryers

FRYERS

There are two major types of fryers – conveyor and batch type. In addition, there are different types of heating systems including immersion tube heating in conveyor units and external oil heating systems for many batch type fryers. The external oil heaters use a heat exchanger with a gas fired burner or another heat source such as a thermal fluid heater regulated by SCAQMD Rules 1146.1 or 1146.2. Both types of fryers and heating systems have been tested and comply with the rule 1147 emission limit.

Seven existing in-use fryers have completed emission testing and comply with the Rule 1147 NOx emission limit of 60 ppm. The tested units are from three different manufacturers. All units were tested with their original burner systems. One unit is a conveyor fryer with many small immersion tube burners and a total heat rating of 1.5 mmBtu/hour. The other units use single burners with a heat exchanger and have heat ratings from 1.5 to 2.5 mmBtu/hour. The average NOx emissions are about 30 ppm with a range from 14 ppm to 56 ppm.

A variety of systems from three different manufacturers have been tested and comply with the Rule 1147 NOx emission limit. The units complied with the 60 ppm using different types of heating systems. Based on the units completing testing, the Rule 1147 emission limit is achievable with the original heating systems installed for these fryers.

Appendix I – Heated Process Tanks

HEATED PROCESS TANKS

Heated process tanks, parts washers and evaporators are a category of 1147 equipment for which it is difficult to accurately estimate the number of units that are subject to Rule 1147. While evaporators and parts washers with an integrated heated tank are typically separate units with their own permit, most process tanks are permitted as part of a process line with other processes and tanks. Because Rule 1147 only applies to units that require a permit; an individual tank is only subject to Rule 1147 if it is heated by burners and either has emissions of VOC, PM or toxic air contaminants or the rating of the burner system is greater than two million BTU per hour (2 mmBtu/hour).

For example, tanks with mixing from an air sparging system are more likely to have VOC, PM or toxic emissions and require emission controls and a permit than those that do not. Otherwise a tank is exempt from the requirement for a permit as defined by SCAQMD Rule 219. However, if a process tank does not require a permit, it is still included in the description of a process line in order to provide a complete description of the process for SCAQMD permitting and compliance staff. Process lines are permitted as one unit in order to reduce the cost and administrative burden of permits.

There are approximately 1,400 process tanks identified in the SCAQMD permit system. About 1,200 of them are unheated, heated electrically or heated by a boiler. Of the remaining 200, at least 160 have burners rated less than the size requiring a permit. The number of heated process tanks subject to Rule 1147 is estimated to be between 20 and 40 with a best estimate of 25 units. The heat ratings of process tanks subject to Rule 1147 varies from 2.2 to 9 mmBtu/hour. Staff has also identified 23 evaporators with SCAQMD permits that are potentially subject to Rule 1147. There are also an unknown number of parts washers that are potentially subject to Rule 1147 depending upon their size, configuration and emissions. Tanks, evaporators and washers with electric, boiler steam or thermal fluid heating are exempt from Rule 1147. Equipment heated using a separate enclosed heated tank are potentially subject to SCAQMD Rules 1146, 1146.1 or 1146.2 which regulate boilers and enclosed process heaters.

Many heated process tanks, evaporators and parts washers use immersion heating tubes to heat a solution in a tank. Immersion tube burners fire into and heat a tube and that heat is transferred to the solution from the tube by conduction and convection. The efficiency of heat transfer depends upon the diameter and length of the tube. The efficiency of heat transfer in a tank system can vary from about 60% to over 90%.

To date only a few heated process tanks and evaporators have performed testing because some were installed within the last 15 years, others have emissions less than or equal to one pound per day and most are exempt because they do not require a permit. Seven units have been tested and reviewed by SCAQMD staff. None of these units replaced their burners. All tested units comply with the Rule 1147 NOx limit of 60 ppm for heated process tanks, evaporators and washers with their original burners.

Process tanks, evaporators and washers with their own burners use a variety of heat exchange systems to heat a solution or assist in evaporation. Most process tanks use a constant diameter tube to heat a solution. Evaporators either use custom designed air to solution heat exchangers or constant diameter tubes to provide heat to a solution. Most parts washers use a custom designed heat exchange system or a separate water heater.

Custom designed heat exchange systems have various configurations but start out with a combustion zone with a larger cross section than the remainder of the heat exchanger. These systems typically start with a combustion chamber that is about 8 to 16 inches across that extends the full length of the burner's flame. The combustion section of the heat exchanger is large because manufacturers use burners that are designed for a wide variety of applications including boilers, furnaces and ovens.

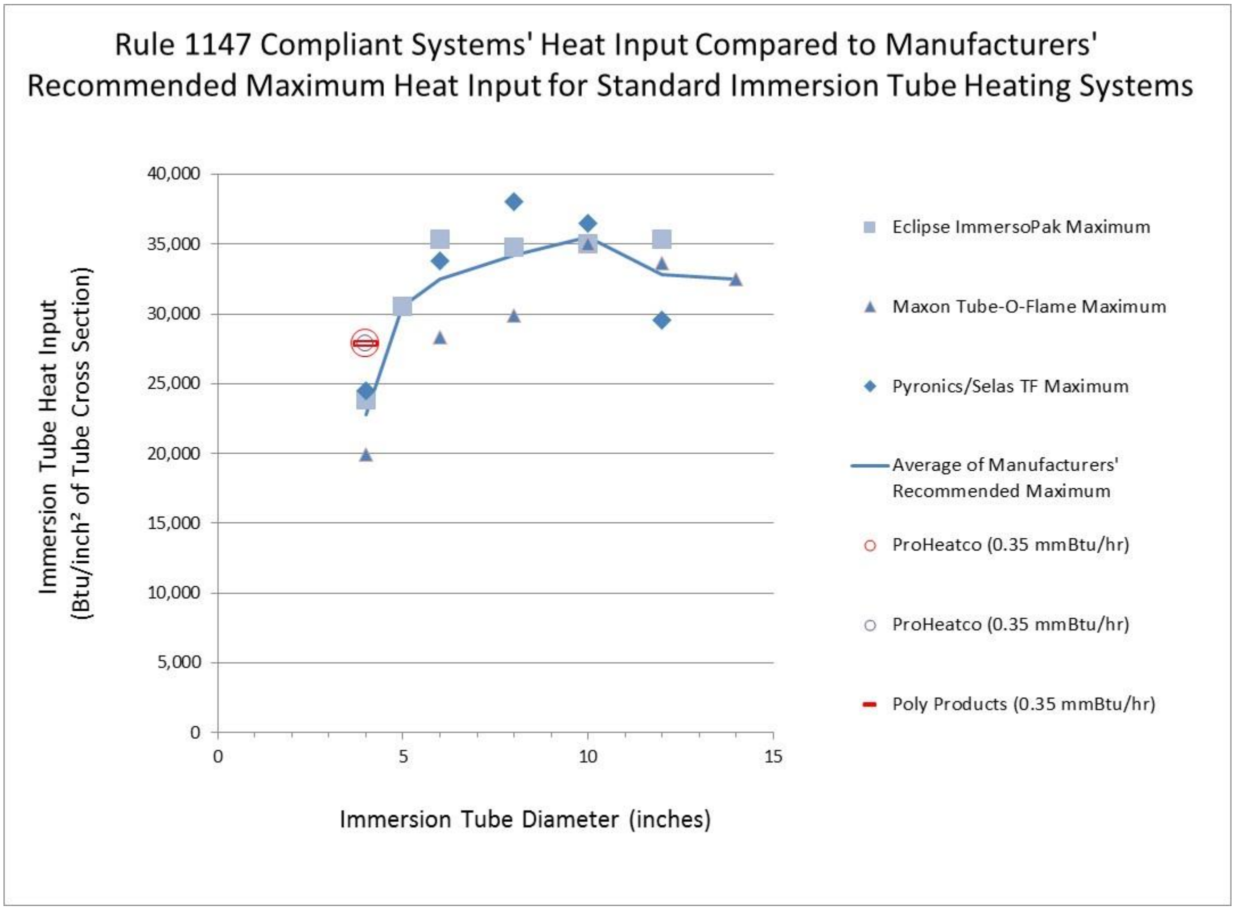
Emission testing has been performed on three evaporators using custom designed heat exchangers – two units from Encon using MidCo burners and one unit from Lakeview Engineering unit using a burner from Industrial Combustion. The heat input for these systems are 220,000 and 650,000 Btu/hour for the Encon evaporators and 1.5 mmBtu/hour for the unit built by Lakeview Engineering. NOx emission for these units ranged from 25 to 52 ppm.

Most process tanks and some evaporators use a constant diameter tube system and immersion tube burners to heat the solution tank. However, there are three types of heat exchange systems using constant diameter tubes. Each system has its own range of tube diameter depending upon the amount of pressure the burner produces and the allowable heat input to an individual tube. In addition, burners for these systems can be set up in a variety of ways depending upon the type of process tank. Burners can be set to fire at a maximum firing rate and off, fire at a high and low rate or modulate and fire across the whole range of the burner. Burners can also be set to fire at a fixed amount of combustion air or variable amount of combustion air in order to maintain a constant ratio of fuel and air over the firing range of the burner.

The most common heating tube system typically has tubes that vary from about four inches up to 14 inches in diameter. Burners for this system are available from many manufacturers including Eclipse, Maxon, Selas/Pyronics and Titan Engineering. The heat input in this type of system varies from about 20,000 to 30,000 Btu per square inch of tube cross section in four and five inch tubes and 25,000 to 40,000 Btu per square inch in six to 14 inch diameter tubes. Three of these systems have been tested – two heated evaporator tanks from Proheatco and one heated evaporator tank from Poly Products. All of these systems use a burner with a maximum rating of 350,000 Btu/hour and 4 inch diameter heating tubes. NOx emissions from these three units vary from 30 to 55 ppm. In addition, preliminary testing of a unit at another facility with a higher output burner of about 3 mmBtu/hour indicates that unit has NOx emissions of 40 to 50 ppm.

Figure I-1 provides a summary of burner and tube characteristics of the three tested units from Proheatco and Poly Products. The figure illustrates that the units have firing rates (heat input per square inch) near the maximum recommended by three major manufacturers for the most common type of tube immersion tube heating burners. This metric is important because it impacts the formation of NOx in the heating tubes. The information presented in Figure I-1 and the emission test data indicate that it is technically feasible to comply with the Rule 1147 NOx limit with the most common type of immersion heating burners.

Figure I-1



A second type of tube heating system uses burners that produce higher pressures and can fire into smaller diameter tubes. This type of system uses tubes two to eight inches in diameter with heat inputs per tube cross sectional area double the heat inputs of the standard system discussed above. Eclipse, Maxon and PowerFlame manufacture burners for this type of application. There are currently no emission test results available for these types of burners so it is not possible to determine if they comply with the Rule 1147 NOx emission limit of 60 ppm.

A third type of tube heating system for process tanks has been installed in new heated tanks. This system has a new type of burner from Maxon (an XPO burner) that requires larger diameter tubes (14 inches and above). An SCAQMD approved emissions test on one of these systems (required for Regulation XIII and new source review) with a 3.3 mmBtu/hour burner showed emissions of 4 ppm NOx at high fire and 34 ppm at low fire.

The Rule 1147 testing program has identified three types of heating systems used in process tanks and evaporators that comply with the NOx emission limit. There is no information yet available for a fourth type of heating system that uses high pressure burners firing into smaller diameter tubes of 2 to 8 inches. A fifth type of tank heating system with tube firing burners used in heat treating also been demonstrated to meet the 60 ppm NOx limit but have not yet been tested in heated tank applications.

For all five types of tank heating systems, the burners and heat exchangers or tubes are designed as one integrated system. If an individual heated tank or evaporator system using any of the four systems does not comply with the emission limit, then the whole tank will likely have to be replaced. Delaying compliance for existing in-use units from the rule emission limit until the combustion system is modified or replaced will address the issue that it is not feasible to retrofit an existing heated tank with different burners. If a tank is retrofitted with new burners, the owner will replace the heating tubes or heat exchanger. If the owner rebuilds a process tank, then a rule compliant system can be installed at that time.

SCAQMD staff is considering to amend Rule 1147 to delay compliance with the NOx emission limit for existing in-use process tanks, evaporators and parts washers with an integrated heated tank until the combustion system is modified or replaced. New units would still be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour. Staff estimates this change would affect less than 50 heated tanks and evaporators currently subject to the Rule 1147 emission limit. There are more than 1,200 process tanks which are not subject to Rule 1147 requirements because they are exempt from the requirement for a permit by SCAQMD Rule 219, are unheated or are heated electrically or with a boiler.

Appendix J – Heat Treating

HEAT TREATING

Heat treating typically involves heating metals or alloys in a furnace or oven in order to develop specific properties in the metal or alloy before and after a part is made. However, heating can also be used to treat metals and nonmetallic refractory materials in a manufactured vessel, furnace or other product using temporary burners systems. The burners used in these systems are the same kinds of burners used in direct fired heat treating furnaces and kilns. Kilns are used for heat treating products made from ceramics, clay and other non-metallic materials.

Metal heat treating temperatures vary from a few hundred degrees Fahrenheit, used in tempering, to over 2,100 degrees for forging steel and titanium. With the exception of tempering, steel and titanium alloy heat treatments are typically at higher temperatures than for non-ferrous alloys based on aluminum. Kilns processing non-metallic materials also vary temperature depending upon the material and final product.

The type of burners used for heat treating depend upon the temperature required and whether they fire directly into the furnace or into tubes and heat is then transferred from the tubes to the furnace by fans. Lower temperature heat treating ovens have burners that are typically found in other types of ovens including air heating burners such as Eclipse Winnox and Maxon Cyclomax burners. Higher temperature direct fired furnaces typically use a different type of burner with a higher flame velocity, longer flame length and more radiant heat output for heating refractory material in the furnace or the tubes they fire into. High velocity burners are also used because they increase mixing and eliminate temperature stratification in direct fired furnaces. The new control systems for these low NOx burners are an important component of the system because they provide more precise tuning and control of the combustion process across the firing range of the burner.

Indirect fired furnaces typically have specialized tube firing burners. However, high velocity burners, similar to those found in direct fired applications, have also been used in indirect fired furnaces permitted in the SCAQMD. Temperature stratification in indirect fired furnaces is avoided because large fans move the air in the furnace past the tubes and into the section where the material being treated is held. High velocity and tube firing burners are available from many manufacturers including North American/Fives, Bloom, Eclipse, Maxon, Hot Work, Hauck, Industrial Combustion, and Selas. Tube firing burners from a number of manufacturers including Bloom, Hauck, North American/Fives, and Eclipse also have an option to add flue gas recirculation (FGR) to reduce NOx emissions.

Heat treating furnace designs have evolved over time. Newer furnace designs have more and smaller burners than many earlier designs. For both direct and indirect fired furnaces, more burners provide better control of the temperature profile in the furnace. Finer control of the furnace temperature allows the operator to meet newer more stringent temperature uniformity requirements than those that were in existence when older furnace designs were first built. Some of the older furnace designs predate modern temperature uniformity standards developed since the 1970s. The number and type of burners used in a furnace depend upon the size of the furnace, type of heat treating, process temperature and temperature uniformity requirements of the heat treating processes performed by the furnace.

Figures J-1 to J-4 summarizes the size and number of burners in the heat treating furnaces that have successfully completed emission testing. This information indicates that most of the burners used have heat ratings of 0.5 mmBtu/hour (500,000 Btu/hour) or less and the largest burners are about 2 mmBtu/hour. The largest furnaces have a heat rating of about 8 mmBtu/hour. There are furnaces permitted in the SCAQMD with larger heat ratings, but they are found at facilities in the RECLAIM program and are exempt from Rule 1147.

Figure J-1

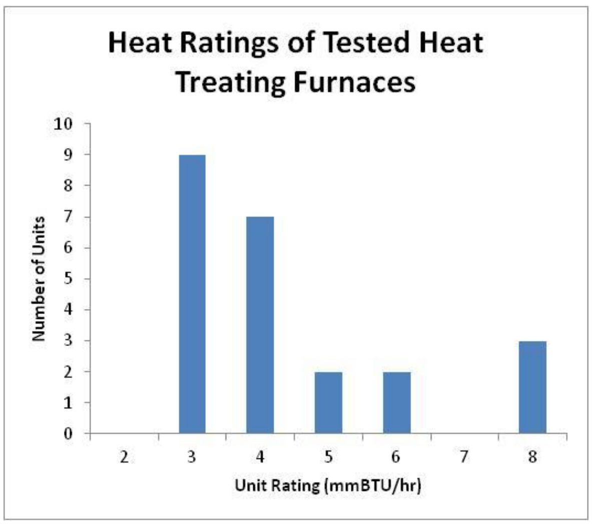


Figure J-2

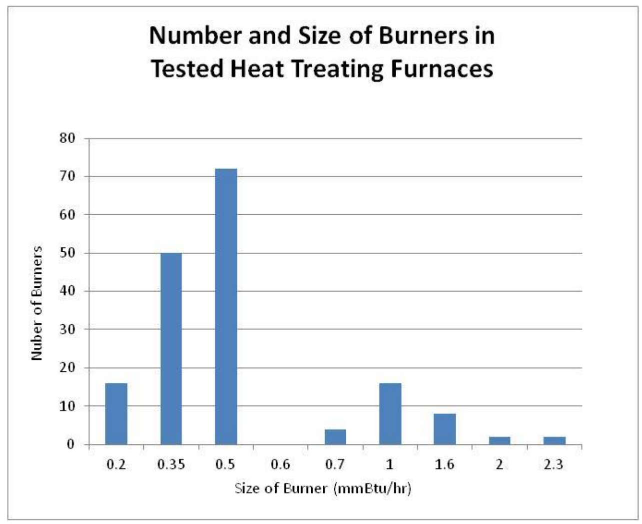


Figure J-3

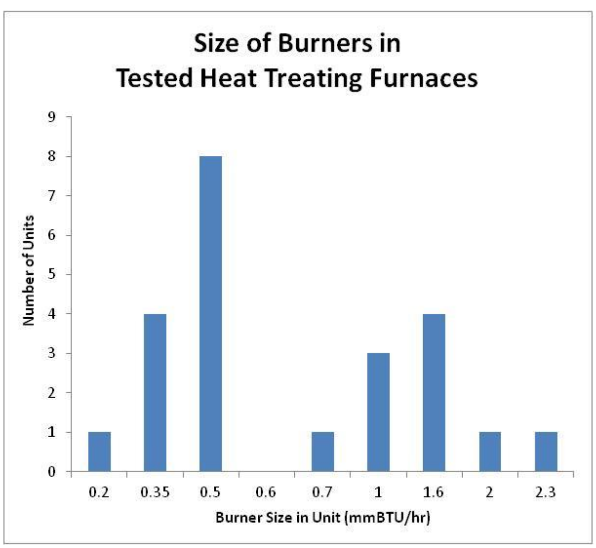
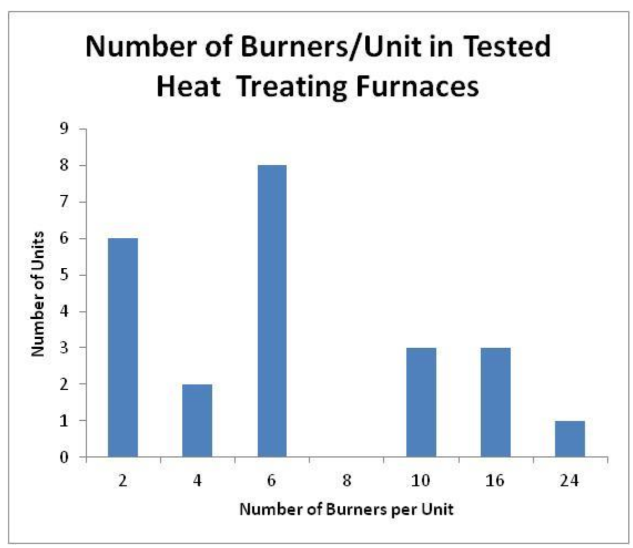


Figure J-4



The emission test results for heat treating furnaces indicate most furnace NOx emission concentrations are in the range from 45 ppm to 55 ppm with an average of about 50 ppm. These results cover a variety of furnaces processing aluminum and steel alloys across a broad temperature range. Some of the furnaces were new and were required to meet the new source BACT requirement of 50 ppm NOx, but most have been in use long before Rule 1147 was adopted in 2008 and before the BACT limit of 50 ppm was put in place in 2000. To date, only a few furnaces have had their burners replaced, added an FGR system or replaced their furnace in order to comply with Rule 1147. Most heat treating furnaces tested have met the Rule 1147 emission limit with their existing burners.

Kilns use the same burners that are found in direct fired heat treating furnaces and crematories. Kilns are used to heat treat clay, ceramic and other nonmetallic materials. Kilns are also used to heat treat glazes and other coatings applied to products made from these materials. Rule development staff have not yet received new emission test results for kilns from the Rule 1147 testing program. However, there were a number of emission tests completed on small and large kilns prior to rule adoption in 2008 and the rule amendment in 2011. These test results are summarized in Appendix B of this document. The emission test results demonstrate that a variety of kilns comply with the Rule 1147 emission limit of 60 ppm NOx with the burners installed prior to rule adoption. In addition, many small kilns are not subject to Rule 1147 because they are exempt from the requirement for a permit under SCAQMD Rule 219 (some of these use electric heat).

Appendix K – Metal Melting

METAL MELTING

A variety of metal melting furnaces are subject to Rule 1147. They include small pot and crucible furnaces for melting lead, lead alloys, aluminum, zinc and zinc alloys and larger units including kettle furnaces for galvanizing and reverberatory furnaces for melting aluminum. There are about 170 metal melting furnaces potentially subject to Rule 1147 NOx emission limits. Most of the furnaces subject to Rule 1147 melt non-ferrous metals and alloys. Furnaces for melting iron or making steel are often electric and therefore not subject to Rule 1147. There are also many furnaces at large facilities which are exempt from Rule 1147 because the facility is in the RECLAIM program.

To date, most of the metal melting furnaces tested complied with the Rule 1147 NOx limit with the burners in place when the rule was adopted. All of the larger kettle and reverberatory furnaces passed the emission limit with their original burners. However, one kettle furnace and one reverberatory furnace were recently built to replace older units and were subject to BACT under new source review. The four larger furnaces whose permits identified the burner manufacturer had Eclipse burners.

Of the five small pot and crucible melting furnaces tested, three furnaces met the emission limit with their original burners. The other two units had their burners replaced before testing. This type of furnaces can be built with burners from many manufacturers including Eclipse, Maxon, MidCo and others. One pot furnace had its original burner replaced with an Eclipse Ratio Air burner in order to comply with the NOx emission limit of 60 ppm. The new burner also had low CO emissions. A second company chose to replace two burners on a large pot furnace (2 mmBtu/hour originally) with one larger 2.4 mmBtu/hour Maxon Kinedizer LE burner, but it is not known whether the original burners would have met the Rule 1147 NOx limit. The burners were replaced in order to increase production of the furnace and to reduce fuel consumption and emissions. The new configurations was subject to BACT under new source review and complies with the Rule 1147 NOx emission limit and has low CO emissions.

The heat ratings of the pot/crucible furnaces tested ranged from 0.5 - 2.4 mmBtu/hour. The NOx emissions for these pot/crucible furnaces were in the range of 49 to 60 ppm. The eight kettle and reverberatory furnaces have unit heat ratings from 1.2 – 6 mmBtu/hour with emission ranging from 40 ppm to 53 ppm. However, the units greater than 4 mmBtu/hour have multiple burners rated 1.2 – 1.5 mmBtu/hour. The highest heat rating for a unit with one burner is 2 mmBtu/hour. There are furnaces with larger heat ratings permitted in the SCAQMD, but they are at facilities in the RECLAIM program and are exempt from Rule 1147.

The eight metal melting furnaces tested complied with the Rule 1147 NOx emission limit. Two of the units were new and built to replace old units. It is not known whether the old units would comply with the emission limit. One pot/crucible furnace was rebuilt with a larger burner to increase capacity. Another small pot furnace had its burner replaced to comply with the Rule 1147 NOx emission limit. All of the unmodified units, the new units and the units with replaced burners complied with the rule emission limit.

Appendix L – Multi-chamber Burn-off Ovens and Incinerators

MULTI-CHAMBER BURN-OFF OVENS AND INCINERATORS

This category includes various equipment that are used for similar purpose but named differently. These units may be called burn-off or burn-out ovens, kilns or furnaces and incinerators. However, all of the units perform a similar function and operate in a similar fashion. They are built with a primary chamber for melting, vaporizing or pyrolizing some material on a part or piece of equipment in order to recycle the material or component. Some units are used for incinerating material that cannot be reclaimed or must be incinerated prior to disposal. The primary chamber leads to an integrated secondary afterburner chamber that destroys particulate matter, carbon monoxide, VOCs and any other organic material that enter this afterburner section. The incinerated material is reduced to carbon dioxide and water vapor.

The Rule 1147 NOx emission limit for the primary chamber of a furnace depends upon the process temperature in this burn-off chamber. If the process temperature exceeds 800 °F, then the NOx emission limit in the primary chamber is 60 ppm. If the process temperature is lower, then the NOx limit is 30 ppm which is consistent with a typical oven or low temperature furnace operating at those temperatures. The NOx limit for the secondary afterburner chamber is 60 ppm NOx and the same as for other afterburners.

Twelve burn-off ovens, furnaces and incinerators have completed review of their test results. Most units were tested with original burners. The number of burners in these units varies from two to six burners and the most common configuration has two or three burners. The heat ratings of the units range from 0.5 to 2.2 mmBtu/hour. The average NOx concentration in the stack after the afterburner section is less than 45 ppm and the range is from 26 to 54 ppm.

Discussion with a local manufacturer of burn-off furnaces indicates that it is not possible to use the preferred type of burner and meet a 30 ppm emission limit in the primary chamber for a process temperature less than 800 °F. The typical burner that is used to remove materials from a part is the same type of high temperature medium to high velocity burner used in crematories, kilns, heat treating and some types of afterburners. These burners are designed to have NOx emissions in the 40 to 60 ppm range.

The manufacturer has tested a design with an air heating burner in the afterburner section to achieve emissions of less than 30 ppm in the secondary chamber and meet an average emission limit for the two chambers of less than 45 ppm NOx. However, this redesign will not achieve the required PM, VOC and carbon monoxide reductions in all applications. In addition, using the averaging provision of the rule may not always achieve compliance with the NOx limit. Company representatives have suggested that since it is not always possible to comply with the emission limit of 30 ppm in the primary chamber of these types of devices, the NOx limit in the primary chamber should be 60 ppm NOx regardless of the process temperature.

SCAQMD staff agree with this assessment and are considering a rule change that the NOx emission limit in both chambers of this type of equipment should be 60 ppm at any process temperature. This change will also be considered for similar processes that use the same types of burners. This change in the rule limit would affect a small number of equipment regulated by Rule 1147.

Appendix M – Ovens and Dryers

OVENS AND DRYERS

Excluding spray booth systems, the number of ovens and dryers under permit in the SCAQMD is slightly less than 1,200 units. This is the second largest category of equipment regulated by Rule 1147. These units are used in a variety of processes including curing of coatings and other materials, drying coated and printed products, and drying materials. The oven or dryer can be a small enclosed batch oven with a heating system, a large walk in oven, a conveyor system with a coating tank or coating spray station followed by a heated oven, or a drying room with a unit heater. Some printing and all textile drying operations use large conveyor units with multiple burners for high speed production of large quantities.

There are a variety of burners used in ovens and dryers. Each type of burner has its own characteristic emission profile. For example, radiant infrared burners have low emissions and NOx concentrations are typically less than 20 ppm. The most common type of burners used are nozzle mixing air heating burners. Some of the same types of ovens use premix burners with a metal fiber fabric cylinder or panel as a flame holding surface. Other units are designed to use line type air heating burners. Some small ovens and large conveyor systems use many flat panel radiant infrared burners. Powder coating operations are one of the processes that use radiant burners. Radiant infrared burners are required to directly heat a part in order to melt and then cure the coating. Ovens in which combustion gases cannot come in contact with the produce use indirect fired heater units with an air to air heat exchanger to provide clean heated air to the oven. However, both direct and indirect-fired unit heaters can be used to provide heat and move air through large drying ovens or rooms.

Ovens subject to the Rule 1147 NOx emission limit use burners from a number of manufacturers. The most common burners used in the SCAQMD are line and nozzle mix burners manufactured by Eclipse and Maxon. Two thirds of the tested ovens and dryers use Maxon burners and one fourth of the units use Eclipse burners. Eclipse burners used in compliant ovens and dryers include the Eclipse Winnox and Linnox product lines. Maxon burners used in compliant ovens include several versions of the OvenPak series, the Cyclomax, the LN-4 line burner and the Kinedizer. However, low NOx burners from other manufacturers including MidCo, PowerFlame, Riello, and Yukon also comply with the Rule 1147 NOx emission limit. The newer control systems for these low NOx burners are the most important component of the combustion system because they offer more precise tuning and control of the combustion process across the firing range of the burner.

Most ovens and dryers tested use only one burner. However, coating, printing and curing lines often have multiple burners. Many coating and printing lines use two identical burners, but the oven section of a coating line can also have up to 40 infrared radiant panels.

The tested ovens' heat ratings varies across a wide range from 0.4 mmBtu/hour for a small batch oven up to 20.5 mmBtu/hour for a large rotary dryer. However, most ovens have ratings less than 2.5 mmBtu/hour. Most burners in ovens with multiple burners are also less than 2.5 mmBtu/hour. The most common size of burner installed in all types of oven is 1.0 mmBtu/hour.

Figures M-1 through M-4 identify burner heat rating, number of burners and the range of the heat ratings for the tested units. Printing oven and textile dryer data is not included in Figures M-1 and M-2. Printing oven data is summarized in Figures M-3 and M-4.

Figure M-1

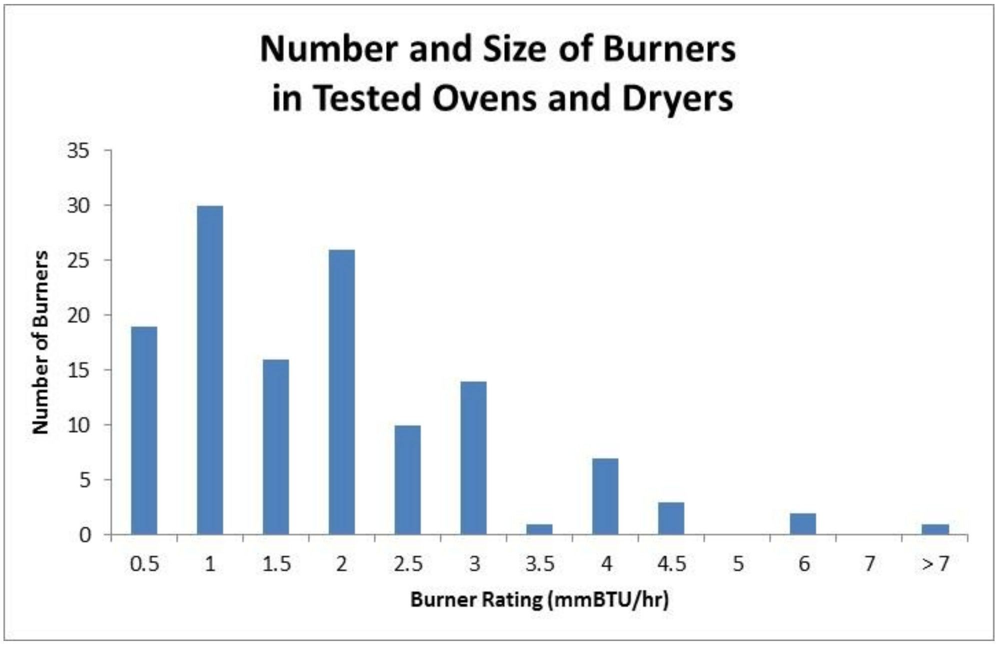


Figure M-2

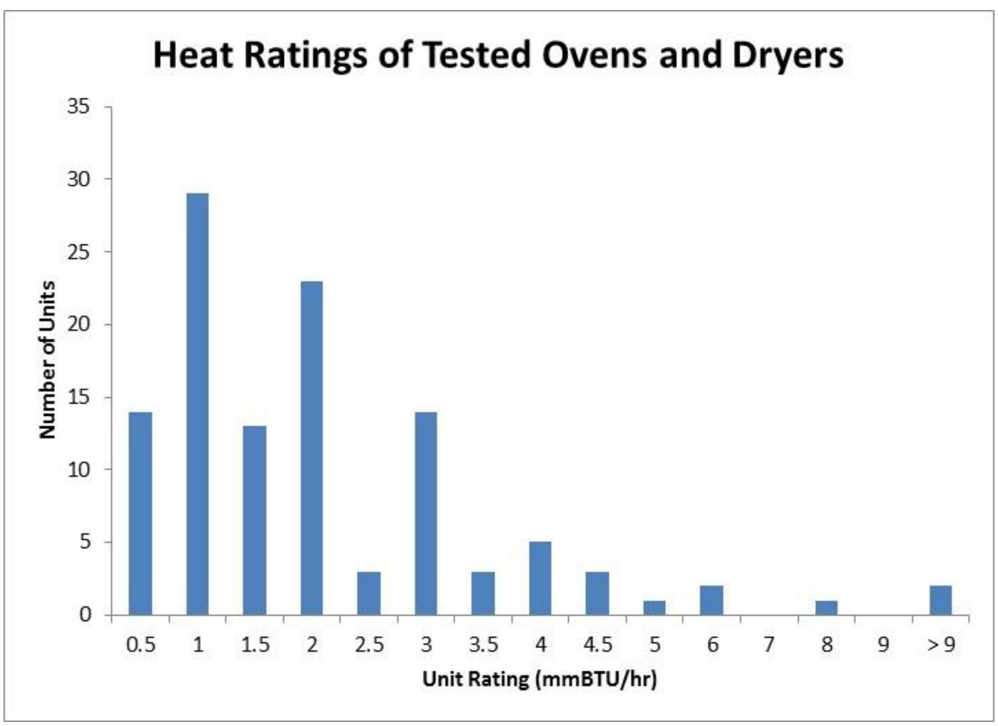


Figure M-3

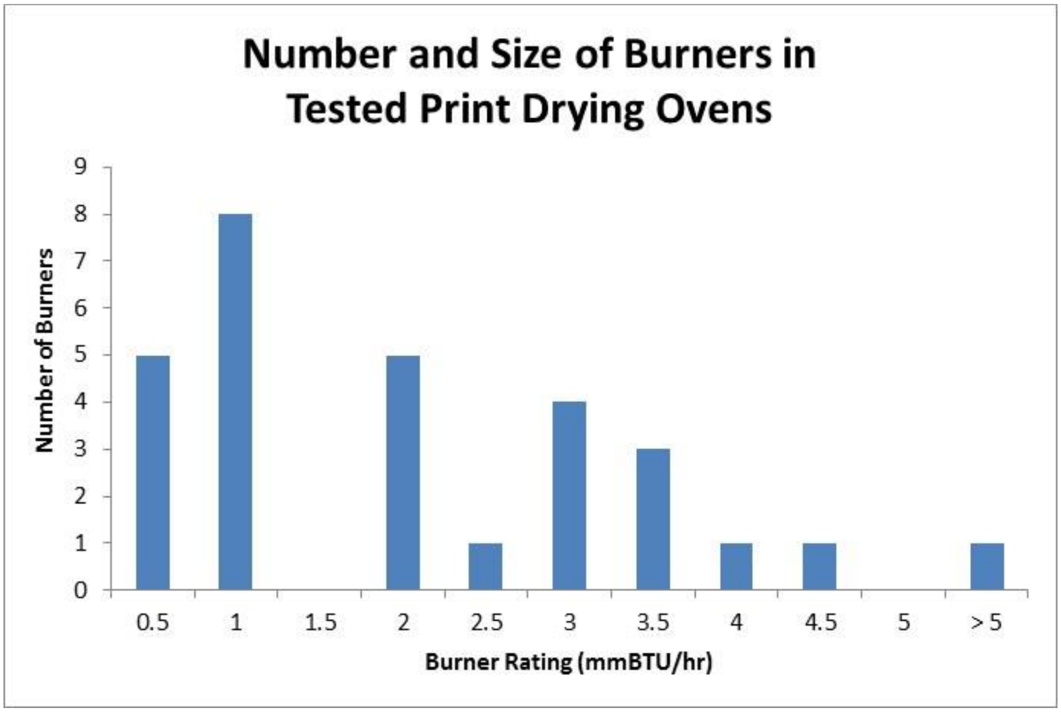
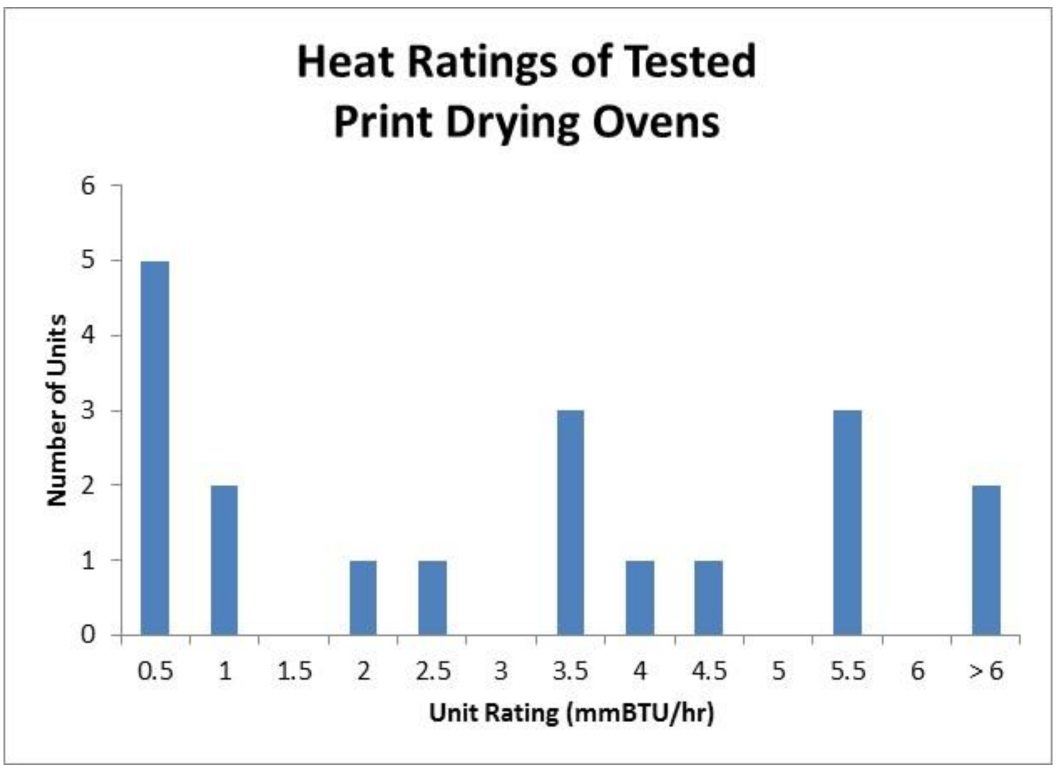


Figure M-4



Printing oven and dryer heat ratings vary from about 0.4 mmBtu/hour to 7.4 mmBtu/hour. The most common burner size in these ovens is also 1.0 mmBtu/hour. Textile tenter dryers typically have eight or nine burners that are rated less than 1.0 mmBtu/hour. The other type of textile dryer typically has four burners each rated about 1.0 mmBtu/hour.

The emission test results for ovens and dryers indicate that all types of units tested comply with the Rule 1147 NOx emission limit. Table M-1 provides a summary of the completed Rule 1147 emission tests for ovens and dryers. At this time, 140 units used for a variety of processes have approved test results and comply with the 30 ppm NOx limit. The average emission concentration for most ovens and dryers is about 20 ppm NOx. The average emission concentration for textile dryers is about 25 ppm NOx. The range of emission concentrations for all ovens and dryers is from 4 ppm to 30 ppm. The range emission concentrations for printing lines and ovens is 4 ppm to 29 ppm and for textile dryers is 14 ppm to 27 ppm. In addition, two ovens complied with the rule limit by averaging emissions from the oven and an afterburner that must comply with a NOx emission limit of 60 ppm.

Table M-1

Rule 1147 Emissions Test Results for Ovens and Dryers

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		140		44	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.
[2] The emission limit depends upon the process temperature.

The results from the Rule 1147 emission testing program indicate that rule compliant technology is available for ovens and dryers from many sources. In addition, all of the types of ovens and dryers under permit in the SCAQMD can comply with the Rule 1147 NOx limit. However, there is a lower limit on the availability of low NOx burners for ovens and dryers. The smallest low NOx burners available are rated 0.4 and 0.5 mmBtu/hour (400,000 and 500,000 Btu/hour). Burners in this size are available from a number of manufacturers including Eclipse, Maxon, MidCo and PowerFlame. For lower firing rates, oven manufacturers will use this size of burner but limit the firing rate to less than the burner’s maximum capacity. If these burners must regularly operate at less than 30% of the maximum firing rate, it may be difficult to comply with the NOx emission limit. Because there is a lower limit on the size of compliant burners that can achieve 30 ppm NOx for ovens and dryers, staff is considering an exemption from the Rule 1147 NOx emission limit for units with heat input capacities less than 325,000 Btu/hour. Based on comments received from stakeholders, staff will also consider an alternative higher emission limit of 60 ppm NOx for these small burners.

Appendix N – Food Ovens

FOOD OVENS

Food ovens in use at the time SCAQMD Rule 1153.1 was adopted are no longer subject to Rule 1147. However, new food ovens are currently subject to Rule 1147 requirements. Staff are currently evaluating alternative rule development options for exempting new food ovens from Rule 1147. Although new food ovens may be exempt from Rule 1147 in the future, some operators of food ovens have reported results under the rule's emission testing program. At the time of this report, 13 food ovens used for a variety of baking and cooking operations have completed testing under the Rule 1147 program.

These ovens use burners from many manufacturers including Eclipse, Ensign/Selas, Flynn, Maxon and Weishaupt. Eclipse, Maxon and Weishaupt burners air heating burners are used in both batch and conveyor type convective ovens. Ensign and Flynn provide ribbon burners for heating specific types of conveyor ovens and some small batch ovens. For example, conveyor ovens with moving bands that must be heated in order to cook products on the band such as chips and crackers require ribbon or a similar type of burner. Batch type convective ovens can use a variety of burners and do not require ribbon burners. In addition, there are many conveyor type convective ovens that do not require or use ribbon burners. These convective batch and conveyor ovens use air heating nozzle mix or line burners.

Radiant infrared burners are used in both batch and conveyor ovens. This type of burner is available from many manufacturers including those identified earlier in this discussion. Three bakery ovens using only radiant infrared burners were tested and complied with Rule 1147 and Rule 1153.1 emission limits. This type of burner is used in both batch type and conveyor type ovens. The average NOx emission concentration for these burners is 13 ppm with a range of 6 to 19 ppm. Ovens with radiant infrared burners are exempt from the Rule 1153.1 requirement to perform an emissions test because these burners have NOx emissions significantly less than the emission limits in the rule (40 and 60 ppm NOx).

Four ovens with ribbon burners have been tested through the Rule 1147 emission testing program. Two baking ovens with operating temperatures less than 500 °F both had NOx emission concentrations of 21 ppm at their high or normal fire rate. One had NOx emission concentrations of 26 ppm at low fire. One of the units is used for baking tortillas and the other unit is used for baking breads and snacks. In addition, two griddle ovens used for making English muffins and other products cooked in griddles had emission concentrations of 41 ppm and 45 ppm. Griddle ovens with ribbon burners typically operate at temperatures above 500 °F. Both of these ovens comply with the Rule 1153.1 NOx emission limit of 60 ppm for this process temperature.

Five convection type ovens using nozzle mix air heating burners have been tested and comply with Rule 1147 and 1153.1 NOx emission limits. Two of the ovens are used to cook meat products and three cook breads and snacks. These ovens have average emission concentrations of 25 ppm NOx with a range of 22 ppm to 30 ppm. One of these units has a permit limit of 25 ppm NOx that was established prior to adoption of Rule 1147. This oven has been operating for more than seven years with this permit condition and demonstrates that a 25 ppm NOx emission limit is achieved in practice for convection ovens.

The remaining oven that was tested is used for cooking meat and has two cooking sections. The first section is a charbroiler and the second is a convective heating section using steam and heated air. The heated air in the second section is produced using an Eclipse Air Heat line burner. The NOx emission concentration from all burners for this unit was 33 ppm. This result demonstrates compliance with Rule 1153.1 NOx emission limits of 40 ppm and 60 ppm. However, given the design and purpose of this unit, the first section of this device is exempt from the emission limits of Rules 1147 and Rule 1153.1 because it is a charbroiler. The exemption for charbroiling in both Rules 1147 and 1153.1 was not taken into account when the emission test protocol was prepared for this unit.

The results for the 13 food ovens tested through the Rule 1147 program indicate that every type of food oven and burner comply with Rule 1153.1 NOx emission limits. In addition, convection ovens using air heating burners, ovens with radiant infrared burners and conveyor type food ovens with ribbon burners operating at less than 500 °F also comply with the Rule 1147 NOx emission limit of 30 ppm. Moreover, another conveyor oven with ribbon burners and a process temperature less than 500 °F was tested prior to Rule 1147 adoption and had NOx emissions of less than 30 ppm (Figure B-5, Appendix B).

Currently, there are projects funded by SEMPRA Energy and the California Energy Commission to reduce NOx emissions from ribbon burners used in commercial and residential cooking ovens. The data from the Rule 1147 and Rule 1153.1 emissions testing programs and these technology projects will provide staff with data to determine how Rule 1147 and Rule 1153.1 should be amended in the future to limit NOx emissions from new food ovens.

Appendix O – ETS, Inc. Independent Technical Review of SCAQMD Draft Technology Assessment for Small and Low Emission Sources – Regulated by SCAQMD Rule 1147 (NOx Reductions from Miscellaneous Sources)

ETS, INC.

INDEPENDENT TECHNICAL REVIEW OF SCAQMD DRAFT TECHNOLOGY ASSESSMENT FOR SMALL AND LOW EMISSIONS SOURCES – REGULATED BY SCAQMD RULE 1147 (NO_X REDUCTIONS FROM MISCELLANEOUS SOURCES)

FINAL REPORT

OCTOBER 26, 2016

SCAQMD CONTRACT NO. 16398

ETS, INC. CONTRACT # 16-2350-C

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I. EXECUTIVE SUMMARY

South Coast Air Quality Management District (SCAQMD) Rule 1147 – NOx Reductions from Miscellaneous Sources was adopted by the SCAQMD Governing Board on December 5, 2008 for the purpose of reducing NOx emissions from a wide variety of combustion sources. Rule 1147 affects new and existing (in-use) combustion equipment requiring permits that is not regulated by other SCAQMD NOx rules and incorporates the following two control measures of the 2007 Air Quality Management Plan (AQMP): 1) CMB-01 – NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces and 2) MCS-01 – Facility Modernization. SCAQMD Rule 1147 has been identified as an important component of the attainment strategy to meet both the federal annual $PM_{2.5}$ ambient air quality standard and the federal 8-hour ozone standard.

Rule 1147 was amended by the SCAQMD Governing Board on September 9, 2011 and included a requirement for SCAQMD Staff to perform an updated technology assessment for combustion equipment with NOx emissions of one pound per day or less. Also, at the September 9, 2011 Governing Board Meeting Staff proposed to hire an independent third party to review, discuss with Stakeholders, and provide comments on the Technology Assessment. A Request for Proposals (RFP # P2016-22) titled "Technical Review of Rule 1147 Technology Assessment for Small and Low Emission Sources" was released by SCAQMD on April 1, 2016 with a proposal due date of May 5, 2016. The purpose of the RFP was to solicit qualified firms to review and provide comments on the SCAQMD Draft Technology Assessment of small and low emission combustion equipment regulated by SCAQMD Rule 1147.

ETS, Inc. (ETS), an independent air emissions control consulting firm, submitted a proposal in response to RFP # P2016-22 and was notified as being selected for contract award in June 2016. The primary focus of the ETS review, as described in the scope of work, was to review and provide comments on SCAQMD Staffs' Draft Technology Assessment for Rule 1147 Small and Low Emission Sources that was released for public review on January 29, 2016. The purpose of the SCAQMD assessment was to evaluate the technical feasibility of retrofitting small and low emission units to comply with Rule 1147 NOx emission limits and the cost and cost effectiveness of replacing heating systems in those units for the categories of Rule 1147 equipment that were not addressed through amendment of Rules 219 and 222 and adoption of Rule 1153.1.

The ten major categories of equipment that were identified in the Draft Technology Assessment and evaluated by ETS were: 1) afterburner technologies, 2) spray booths, 3) crematories, 4) fryers, 5) heated process tanks, 6) heat treating, 7) metal melting furnaces, 8) multi-chamber burn-off ovens and incinerators, 9) ovens and dryers, and 10) food ovens. Some of the processes utilizing the above equipment and regulated by Rule 1147 were described as including, but not limited to, coating, printing, textile processing, material processing, and manufacturing using wood, plastics, ceramic and metal materials.

After ETS conducted the initial review of the February 2016 Draft Technology Assessment, a Rule 1147 Task Force meeting was scheduled for August 3, 2016 at SCAQMD headquarters. The purpose of the meeting was as follows:

- Introduce ETS to SCAQMD Staff, Rule 1147 Task Force members, and Stakeholders
- Receive input from the Stakeholders on SCAQMD's Draft Technology Assessment which was released for public review on January 29, 2016
- Discuss the future activities and schedule for Rule 1147

Subsequent to the Rule 1147 Task Force Meeting, Stakeholders were given a deadline of August 23, 2016 to submit all inputs, data, comments, and/or concerns to ETS for independent review. ETS received information from the Stakeholders between August 3, 2016 and the August 23, 2016 deadline. All of the information received came from the following three Stakeholders: 1) Furnace Dynamics, Inc., 2) Industrial Process Equipment, Inc., and 3) Wirth Gas Equipment, Inc. ETS identified the information received from the three Stakeholders as nine distinct item numbers (Item #'s 1-9) by the date received. Additionally, two undated items and a third item were received after the August 23, 2016 deadline (Item #'s 10-12) from Industrial Process Equipment, Inc. and Furnace Dynamics, Inc.

The first category of comments received from the Stakeholders dealt with the availability of low NOx replacement burner technology for a specific application within the heated process tanks, evaporators and parts washers' equipment category. Similar comments were received from all three Stakeholders regarding a specific parts washer application within that equipment category, which was one of the ten major categories of equipment identified in the Draft Technology Assessment. The second category of comments from one Stakeholder was regarding the methodology of the cost effectiveness analysis. A third category of Stakeholder comments received by ETS included copies of comments that were indicated as being submitted directly to SCAQMD Staff prior to the release of the solicitation for third-party review; however, many of the comments were not explicitly applicable to the review of the February 2016 Draft Technology Assessment Rule for 1147 Small and Low Emission Sources. Those Stakeholder comments were related to topics such as Rule 1147 compliance activities or past rule development and potential future rule amendments.

The ETS comments on the burner technology review and the cost and cost effectiveness data and analysis conducted in the Draft Technology Assessment are included in this report. Comments received from the three Stakeholders during this project have also been addressed with ETS responses. In consideration of the Stakeholder comments received and based upon a detailed review of the February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources, ETS concurs with the five recommendations that were presented in SCAQMD Staff's assessment. The five recommendations by equipment category for Rule 1147 may be found in Table ES-1 along with the following additional recommendation by ETS:

> Change the NOx emission limit from 30 ppm to 60 ppm in the afterburner technologies equipment category for processes that operate at or below 800°F. This new NOx limit of 60 ppm will be the same compliance limit required for higher temperatures and therefore the same limit at any process temperature in the afterburner technologies category. (ETS Recommendation #6)

TABLE ES-1

Summary of Recommendations from Rule 1147 Draft Technology Assessment and ETS Comments/Recommendations

Equipment Category	Rule 1147 Recommendations	Basis for Recommendation	ETS Comments
SCAQMD Staff Recommendations in Rule 1147 Draft Technology Assessment:			
Low Temperature Operations Including Ovens and Dryers	Exempt new and existing in-use units with total rated heat input of less than 325,000 Btu/hour	Technical Feasibility	ETS concurs with SCAQMD Staff Recommendation #1
Evaporators, Heated Process Tanks, or Parts Washers with an Integrated Heated Tank	Delay compliance with the NOx emission limit for existing in-use units until the combustion system or tank is modified, relocated or replaced	Technical Feasibility	ETS concurs with SCAQMD Staff Recommendation #2
Multi-chamber Burn-off Ovens, Burn-out Furnaces, and Incinerators	Change the NOx emissions limit from 30 ppm to 60 ppm NOx for the primary chamber of equipment in this category for processes that operate at or below 800°F (same limit for all process temperatures)	Technical Feasibility	ETS concurs with SCAQMD Staff Recommendation #3
Units with actual NOx emissions of one pound per day or less	Delay compliance with the NOx emission limit for other existing in-use units with actual NOx emissions of one pound per day or less until the unit or combustion system is modified, relocated or replaced	Cost Effectiveness	ETS concurs with SCAQMD Staff Recommendation #4
Spray Booths	Delay compliance with the NOx emission limit for existing in-use units until the booth or heating system is modified, relocated or replaced	Cost Effectiveness	ETS concurs with SCAQMD Staff Recommendation #5
ETS Recommendation After Review of Rule 1147 Draft Technology Assessment:			
Afterburner Technologies	Change the NOx emissions limit from 30 ppm to 60 ppm NOx for equipment in this category with processes that operate at or below 800°F (same limit for all process temperatures)	Technical Feasibility	ETS Recommendation #6

II. STATEMENT OF WORK

ETS, Inc. (ETS) was commissioned by the South Coast Air Quality Management District (SCAQMD), under the direction of the Planning and Rules Manager, to review and provide comments on SCAQMD Staff's Draft Technology Assessment of small and low emission combustion equipment subject to SCAQMD Rule 1147. This independent review focused on the purpose of the Technology Assessment, which was to evaluate the technical feasibility of retrofitting small and low emission units to comply with Rule 1147 nitrogen oxide (NOx) emission limits and the cost and cost effectiveness of replacing heating systems in these units. The review and comments were specific to the Rule 1147 requirements and not the requirements of other SCAQMD rules, including Regulation XIII (New Source Review) or other agencies' or organization's regulations and requirements. ETS was contracted to perform the following services:

<u>Task 1</u> – Review and analyses of technical and cost information compiled by SCAQMD in Draft Rule 1147 Technology Assessment

The SCAQMD Draft Technology Assessment for Rule 1147 Small and Low Emission Sources, found in Appendix A, evaluated the following ten major categories of small and low emission combustion equipment regulated by SCAQMD Rule 1147 – NOx Reductions from Miscellaneous Sources:

1. Afterburner Technologies
2. Spray Booths
3. Crematories
4. Fryers
5. Heated Process Tanks
6. Heat Treating Operations
7. Metal Melting Processes
8. Multi-Chamber Burn-Off Ovens and Incinerators
9. Ovens and Dryers
10. Food Ovens

<u>Task 2</u> – Provide comments and suggestions on the technology review, cost and cost effectiveness data and analysis in the SCAQMD Draft Technology Assessment

The project included a review of the ten major categories of equipment evaluated by SCAQMD and their associated costs and cost effectiveness. ETS also provided review and commentary on the costing approach and the cost effectiveness methodologies used by the agency.

<u>Task 3</u> – Attend at least two meetings with SCAQMD Staff and one with Stakeholders at a Rule 1147 Task Force Meeting at SCAQMD Headquarters

III. RULE 1147 TASK FORCE MEETING HELD ON AUGUST 3, 2016 AT SCAQMD HEADQUARTERS

ETS attended a Rule 1147 Task Force Meeting with SCAQMD Staff, Rule 1147 Task Force members, and Stakeholders that was held at SCAQMD Headquarters on August 3, 2016. The purpose of the meeting was as follows:

- Introduce ETS to SCAQMD Staff, Rule 1147 Task Force members, and Stakeholders
- Receive input from the Stakeholders on SCAQMD's Draft Technology Assessment which was released for public review on January 29, 2016.
- Discuss the future activities and schedule for Rule 1147

The focus of this project effort was to review and provide comments on SCAQMD Staff's Draft Technology Assessment for Rule 1147 Small and Low Emission Sources, dated February 2016, which is located in Appendix A of this report. The Draft Technology Assessment was made available on January 29, 2016 for public review at the following SCAQMD web address: http://www.aqmd.gov/home/regulations/rules/support-documents#r1147. Additionally, Appendix A contains the SCAQMD Governing Board Letter and Draft Rule 1147 Technology Assessment from the Board Meeting date of March 4, 2016 (Agenda No. 25). The synopsis from the Board Meeting states that Staff had proposed to hire a third party to review the Draft Technology Assessment and the Board action was to receive and file the Draft Rule 1147 Technology Assessment.

Appendix B contains items from the August 3, 2016 Rule 1147 Task Force Meeting such as the Meeting Agenda (Attachment B-1), the SCAQMD Staff Presentation (Attachment B-2), and the ETS Presentation (Attachment B-3). Appendix B also contains the sign-in sheet from the Rule 1147 Task Force Meeting (Attachment B-4) and business cards that were provided to both SCAQMD and ETS at the meeting (Attachments B-5 and B-6, respectively).

The primary purpose of the Task Force Meeting was to receive input from Stakeholders prior to preparing an analysis of the Draft Technology Assessment. ETS was under the impression that Rule 1147 Task Force Meeting attendees would have previously reviewed the SCAQMD Staff's February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources prior to the August 3, 2016 meeting date since it had been released for public review on January 29, 2016. Based on that assumption, ETS created presentation slides for each of the five SCAQMD Staff Recommendations that were already documented in the Draft Technology Assessment in order to generate Stakeholder input and discussion during the meeting. Many of the Stakeholder questions or comments received during the meeting required input from SCAQMD Staff present at the meeting because they dealt with topics related to compliance and rule implementation that were either not applicable to the specific ETS tasks or they were topics raised and addressed during the rulemaking process. Also, some of the Stakeholder comments received appeared to have already been addressed and agreed upon by SCAQMD in the Staff Recommendations of the February 2016 Draft Technology Assessment. Staff indicated to the Stakeholders that ETS would be available immediately following the meeting to receive comments and that the ETS contact information could be obtained so that Stakeholders could submit comments subsequent to the meeting.

Several pieces of information were received right after the conclusion of the Rule 1147 Task Force Meeting from Anthony Endres of Furnace Dynamics, Inc. Subsequent to the Rule 1147 Task Force Meeting, Stakeholders were given a deadline of Tuesday, August 23, 2016 to submit all inputs, data, comments, and/or concerns to ETS for independent review. All of the Stakeholder information received by ETS and the ETS responses to comments are addressed in Sections VIII and IX of this report.

IV. INFORMATION REVIEWED BY ETS TO DATE

A. General Information Pertaining to Rule 1147

As previously stated, the primary focus of the ETS project effort was to review and provide comments on SCAQMD Staff's Draft Technology Assessment for Rule 1147 Small and Low Emission Sources, dated February 2016 (Appendix A). Relevant sections from the following additional sources, which were referenced in the Draft Technology Assessment, were also examined during the ETS independent review:

1. EPA, 2002; *EPA Air Pollution Control Cost Manual, Sixth Edition* [EPA/452/B-02-001], United States Environmental Protection Agency, Office of Air Quality Planning and Standards, January 2002.
2. SCAQMD, 2011; *Rule 1147 – NOx Reductions from Miscellaneous Sources*, South Coast Air Quality Management District, September 2011.
3. SCAQMD, 2000; *Best Available Control Technology Guidelines Part C: Policies and Procedures for Non-Major Polluting Facilities*, South Coast Air Quality Management District (August 17, 2000, Proposed Amended October 2016).
4. SCAQMD, 2000; *Best Available Control Technology Guidelines Part D: BACT Guidelines for Non-Major Polluting Facilities*, South Coast Air Quality Management District (October 20, 2000, Proposed Amended October 2016).

B. Information Received from SCAQMD

In order to effectively perform an independent review and analysis of the technical and cost information presented in the Draft Technology Assessment, ETS requested some of the supporting files that SCAQMD Staff had compiled for the development of the Draft Technology Assessment. The following files were provided by SCAQMD to ETS for review, with some confidential information therein:

1. SCAQMD Source Test Databases as of January 2015
2. Summary of Low and High Temp Burner Costs

3. Spray Booth Costs
4. Immersion Tube Heating and Metal Melt Furnace Calculations
5. Contacts for Low NOx Burner Manufacturers
6. Rule 1147 Equipment Category Estimates

C. Additional Sources Referenced by ETS

In addition to the sources mentioned above, ETS consulted numerous sources of information regarding low NOx burner technology applicable to Rule 1147 such as burner manufacturer data, technical feasibility, industry expert reports, etc. Specific sources were cited throughout this report where appropriate.

V. ETS COMMENTS AND SUGGESTIONS ON SCAQMD TECHNOLOGY REVIEW

As explained in the SCAQMD Draft Technology Assessment and as understood by ETS, the primary focus of the ETS independent review was the availability of burner systems and units for small and low use equipment in processes with NOx emissions of one pound per day or less for the remaining categories of Rule 1147 equipment that were not addressed through the amendment of Rules 219 and 222 and adoption of Rule 1153.1. These small and low emission sources are not subject to the best available control technology (BACT) requirements as new sources.

The Draft Technology Assessment contained a large amount of information on the equipment and wide variety of processes regulated by Rule 1147 and utilized information from the SCAQMD permit system, SCAQMD emissions testing programs, and discussions with equipment and burner manufacturers, affected businesses, consulting engineers, industry, and business representatives. The ETS review encompassed SCAQMD Staff's evaluation on the types and number of equipment affected by Rule 1147, the emission characteristics of that same equipment, and the estimates for cost and cost effectiveness of replacing old burners, either by retrofit or replacement of the unit.

The ten major categories of equipment that were evaluated in the Draft Technology Assessment were: 1) afterburner technologies, 2) spray booths, 3) crematories, 4) fryers, 5) heated process tanks, 6) heat treating, 7) metal melting furnaces, 8) multi-chamber burn-off ovens and incinerators, 9) ovens and dryers, and 10) food ovens. Some of the processes utilizing the above equipment and regulated by Rule 1147 were described as including, but not limited to, coating, printing, textile processing, material processing, and manufacturing using wood, plastics, ceramic and metal materials. The largest fraction of the equipment subject to Rule 1147 heats air that is directed to a process chamber which transfers heat to process materials (convective heating). The other categories of equipment directly heat products using a combination of radiant and convective heating.

As defined by SCAQMD Rule 1147, "NOx emissions means the sum of nitrogen oxide and nitrogen dioxide in the flue gas, collectively expressed as nitrogen dioxide." NOx emissions are formed by the following three different mechanisms[1]:

1. **Thermal NOx** is formed by the reaction of nitrogen and oxygen at high combustion temperatures (typically above flame temperatures of 2,370°F (1299°C)).
2. **Fuel Bound NOx** is formed by the direct oxidation of the already-ionized nitrogen contained in the fuel source. For cleaner burning fuels like natural gas and liquefied petroleum gas (LPG), fuel NOx generation is insignificant.
3. **Prompt NOx** is formed from molecular nitrogen in the air combining with fuel in fuel-rich conditions. This nitrogen then oxidizes along with the fuel and becomes NOx during combustion, just like fuel NOx.

The main functions of low NOx burners are to create more uniform combustion, better control the air-fuel mixture, and reduce the combustion residence times. These characteristics will reduce NOx formation and reduce the peak flame temperature at which thermal NOx is formed. The combustion uniformity reduces the formation of fuel rich zones where prompt NOx is formed. Premixing of combustion air with fuel can also aid in keeping the temperature uniform in an oven or furnace, which is often necessary to obtain critical product characteristics.

Another method for controlling NOx emissions for some of the equipment categories regulated by Rule 1147 is flue gas recirculation (FGR). FGR is a technique in which a portion of the cooled exhaust flue gas is recirculated back to the burner. FGR aids in lowering NOx by absorbing heat from the flame to reduce the peak flame temperature and by diluting the oxygen content of the combustion air.

Matt Brueck, Sales Engineer at Maxon Corporation, states the following in an article published in 2002 regarding an oven retrofit to meet lower environmental emission standards:

> [2]The first and most important step in controlling NOx emissions is to use the latest low emission technology. Low emission burners control the air-fuel mixture and flame temperature better than traditional burners that have been on the market for the last 30 years. Traditional oven burners typically produce emissions on the order of 100 ppm NOx corrected (to 3 percent O_2). Newer technology burners can reduce the emission rates to 25 ppm NOx corrected and lower. The second important step is evaluating the application and the environment in which combustion will occur. The chamber temperature is critical to make any emissions guarantee. NOx is formed more easily at higher temperatures, especially above 1,000°F (538°C). Most oven applications are in the range of 300 to 500°F (149 to 260°C), making it easier to control NOx than in a high temperature application.

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[1] EPA, 1999; *EPA Technical Bulletin: Nitrogen Oxides (NO_x), Why and How They are Controlled* [EPA/456/F-99-006R], United States Environmental Protection Agency, Office of Air Quality Planning and Standards, November 1999.
[2] Brueck, Matt; California Emissions Standards Met With Oven Retrofit; *Process Heating*, May 1, 2002.

Low NOx burners are a mature, well proven technology for NOx control and they are available from numerous vendors. The advent of commercially available low NOx burners in the last two decades for miscellaneous combustion sources has allowed for adoption of new rules in the San Joaquin Valley Unified APCD in 2005 and the SCAQMD in 2008.[3] SCAQMD Rule 1147 has been identified as being an important component of the attainment strategy to meet both the federal annual $PM_{2.5}$ ambient air quality standard and the ozone standard.

Based on the analysis conducted in the Draft Rule 1147 Technology Assessment, which was released in February 2016, SCAQMD Staff made a total of five recommendations for proposed changes to Rule 1147. Three of the recommendations were determined based on technical feasibility and the other two recommendations were determined based on cost effectiveness. The two SCAQMD recommendations based upon cost effectiveness, including the ETS comments, will be discussed in Section VII of this report.

ETS concurs with the statement made in the SCAQMD Draft Technology Assessment which states that "with the exception of a few categories of equipment, the technology review demonstrates that low NOx burner systems are available for every category of equipment subject to Rule 1147." For the cases where SCAQMD determined that either low NOx combustion systems are currently not available for some types of small units or some categories of equipment are difficult to retrofit, Staff proposed the following three changes to Rule 1147 based upon technical feasibility:

- Exempt new and existing in-use units with total rated heat input of less than 325,000 Btu/hour from the Rule 1147 NOx emission limit (Staff Recommendation #1)
- Delay compliance with the NOx emission limit for existing in-use heated process tanks, evaporators and parts washers with an integrated heat tank until such time that the combustion system or tank is modified, replaced, or relocated (Staff Recommendation #2)
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators for all process temperatures (Staff Recommendation #3)

VI. ETS COMMENTS AND SUGGESTIONS ON THE SCAQMD DRAFT TECHNOLOGY ASSESSMENT BY EQUIPMENT CATEGORY

The ETS comments and suggestions on the burner availability/technology assessment for all ten major categories of equipment identified and discussed in the Draft Technology Assessment are incorporated below, including any additional ETS recommendations for changes to Rule 1147.

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[3] Ventura County Air Pollution Control District (APCD); *Staff report for: Proposed New Rule 74.34, NOx Reductions from Miscellaneous Sources*, November 2015.

A. ETS Comments on Afterburner Technologies

Based on the estimates in the Draft Technology Assessment, there are approximately 900 units in the afterburner technologies category, representing the third largest group of equipment regulated by Rule 1147, which are used to capture and incinerate VOCs, PM and toxic air contaminates. A review of the information presented in Appendix E of the Draft Technology Assessment and the SCAQMD as of January 2015 indicates that there are a wide variety of processes and burner types represented in this category. The Draft Technology Assessment also stated that "given the variety of processes used as afterburners, their different emission characteristics and older equipment permitted at emission levels close to but above some current BACT levels, a rule NOx limit of 60 ppm was proposed for this category of equipment and adopted in Rule 1147."

While the Source Test Database as of January 2015 indicated that the 24 afterburner units tested passed the 60 ppm NOx limit (with average NOx emissions of approximately 40 ppm and a range from 21 ppm to 54 ppm), it was unclear if any of the units tested had a process temperature ≤ 800°F and were required to meet the 30 ppm NOx limit in Rule 1147 (as defined in Table 2-1 of the Draft Technology Assessment). Most catalytic oxidizers operate at lower process temperatures, ranging from approximately 550°F to 850°F, due to the assistance of the catalyst which promotes the oxidation reaction to occur at a lower temperature than is required for thermal ignition. Some of the catalytic oxidizer units subject to Rule 1147 may utilize the same type of high temperature, medium to high velocity burners that are used in crematories, kilns, heating treating, and burn-off furnaces, which are designed to have NOx emissions in the 40 to 60 ppm range. For example, some catalytic oxidizer units may use the Eclipse Thermjet burner and be capable of meeting the 60 ppm NOx emission limit; however, at a process temperature less than 800°F may not be able to meet the existing 30 ppm NOx emission limit. For the above technical feasibility reasons ETS recommends that consideration be given to change the following in Rule 1147 for the afterburner technologies equipment category:

> Change the NOx emission limit in the afterburner technologies equipment category from 30 ppm to 60 ppm for processes that operate at or below 800°F. This new NOx limit of 60 ppm would be the same compliance limit required for higher temperatures and therefore the same limit at any process temperature in the afterburner technologies category (ETS Recommendation #6)

ETS concurs that the 60 ppm NOx emission limit for the afterburner technologies equipment category is technically feasible, can be achieved with a variety of combustion technologies or possibly with the original burners, and that the source testing demonstrates "achieved in practice."

B. ETS Comments on Spray Booths

The majority of heated spray booths in the SCAQMD are auto body refinishing booths used for refinishing passenger cars and light trucks. ETS reviewed the spray booth equipment category information presented in Appendix F of the Draft Technology Assessment. It was noted that due to an achieved in practice LAER/BACT limit of 30 ppm NOx for makeup air heaters in spray booth applications and the fact that many SCAQMD permitted booths are used as curing or drying ovens in manufacturing operations, a Rule 1147 NOx limit of 30 ppm was justified. It was also noted that BACT for ovens and most dryers has been 30 ppm NOx since 1998.

ETS concurs that there is a variety of available burner technology in this equipment category and the NOx emission limit of 30 ppm is technically feasible. It also appears that there are at least 32 models of booths and heating systems available from eight manufacturers that received certification of compliance with the Rule 1147 emission limits. The average NOx emission concentration of 24 ppm, with a range from 6 ppm to 30 ppm, for the 10 spray booths used in auto body repair was confirmed by ETS in the SCAQMD Source Test Database as of January 2015. The average NOx emission concentration of 18 ppm for the normal/high fire testing of the 13 spray booths that are not used for auto body repair (spray booth (other) category) was also confirmed by ETS.

Please see Section VII.B of this report for ETS comments on heating system costs and cost effectiveness for the spray booth category of equipment.

C. ETS Comments on Crematories

A review of the information presented in Appendix G of the Draft Technology Assessment regarding the 20 crematories that have been tested and comply with the Rule 1147 NOx emission limit was conducted. The 20 crematory compliance tests reviewed by SCAQMD Staff which complied with the 60 ppm NOx emission limit included original burners and many units with new burners and control systems. ETS concurs that the 60 ppm NOx emission limit for the crematories equipment category is technically feasible, can be achieved by available burners and combustion control systems, and that the source testing demonstrates "achieved in practice". The average NOx emission concentration of 50 ppm, with a range from 30 ppm to 59 ppm, for the 20 crematory tests was also confirmed by ETS in the SCAQMD Source Test Database as of January 2015.

D. ETS Comments on Fryers

ETS conducted a review of the information presented in Appendix H of the Draft Technology Assessment regarding the two major types of fryers, conveyor and batch, which also had different types of heating systems including immersion tube heating in conveyor units and external oil heating system for the batch type fryers. It was reported that 7 existing in-use fryers have completed emission testing and comply with the Rule 1147 NOx emission limit of 60 ppm, all of which were tested with their original burner systems. ETS concurs that the 60 ppm NOx emission limit for the fryers equipment category is technically feasible, may be achievable with original heating systems, and that the source testing demonstrates "achieved in practice". The average NOx emissions of 29 ppm for the 7 fryer tests completed, with a range from 14 ppm to 56 ppm, were confirmed by ETS in the SCAQMD Source Test Database as of January 2015.

E. ETS Comments on Heated Process Tanks, Evaporators, and Parts Washers

The review conducted by ETS on this category of equipment consisted primarily of the information presented in Appendix I of the Draft Technology Assessment. Based on Staff's estimations there are roughly 63 units affected by Rule 1147 in this category which consists of heat process tanks, parts washers and evaporators. Within the approximately 63 affected units, Staff has identified and very thoroughly described five different types of tank heating systems that are represented in this equipment category based on individual component factors such as heat exchanger configurations, diameter of heated tube systems, burner types, burner heat inputs, burner firing rates, burner firing pressures, and burner combustion control. Many of the units in this category utilize immersion tube heating tube systems to heat solutions in a tank.

ETS reviewed the Source Test Database as of January 2015 compiled by Staff on the seven units that have completed testing in this category of equipment. All seven units complied with the Rule 1147 NOx limit of 60 ppm for heated process tanks, evaporators and parts washers with average NOx emissions of approximately 37 ppm and range of 4 to 55 ppm. Also, it should be noted that all seven of those units complied with the NOx emission limits using their original burners; however, only three of the different types of heating systems that were described in Appendix I of the Draft Technology Assessment have been identified within the Rule 1147 testing program to date.

The fourth type of heating system identified in the Draft Technology Assessment uses high pressure burners firing into smaller diameter tubes typically ranging from 2 to 8 inches, but none appear to have been tested to date. A fifth type of tank heating system with tube firing burners used in heat treating has also been demonstrated to meet the 60 ppm NOx emission limit, but was noted as not being tested in heated tank applications as of yet.

Fundamentally, ETS concurs that the Rule 1147 NOx emission limit of 60 ppm for this category of equipment should be technically feasible, there is an array of equipment that should be available to achieve the limit, and three of the different types of heating systems have been "achieved in practice". The importance of the design metric utilized in Figure I-1 of the Draft Technology Assessment is appropriately noted as well, since it impacts the formation of NOx in the heating tubes.

One of the challenges within this equipment category, however, is the fact that the burners and heat exchanger tubes are designed as one integrated system and some of the heat exchanger tube systems are custom designed to suit the specific application. This means that if an individual heated tank (process tank or parts washer) or an evaporator system on an existing in-use unit within Rule 1147 does not comply with the emission limit, then likely the entire process tank would have to be replaced.

This issue, however, appears to have already been addressed in the SCAQMD Draft Technology Assessment, which was released for public review on January 29, 2016.

Based upon technical feasibility, ETS concurs with the following SCAQMD Staff recommendation for Rule 1147:

> Delay compliance with the NOx emission limit for existing in-use evaporators, heated process tanks, or parts washers with an integrated heated tank until the combustion system or tank is modified, relocated or replaced. New units would be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour. (Staff Recommendation #2)

F. ETS Comments on Heat Treating Furnaces and Kilns

A review was conducted on the information presented in Appendix J of the Draft Technology Assessment regarding the heat treating equipment category. The processes in this category generally involve heating metals or alloys in a furnace or oven or treating metals and nonmetallic refractory materials in a manufactured vessel, furnace, or other product using temporary burner systems (i.e., kilns used for heat treating products made from ceramics, clay, and other non-metallic materials). The types of burners utilized in the heat treating equipment category depend upon the temperature required and whether they fire directly into the furnace or into tubes which transfer the heat from the tubes to the furnace via fans.

In the case of lower temperature heat treating ovens, the burners are typical of other types of ovens with air heating burners such as the Eclipse Winnox and Maxon Cyclomax burners. For higher temperature applications with direct fired furnaces, high velocity burners such as the Maxon Kinedizer and the Eclipse Thermjet are typically utilized. In the case of indirect fired furnaces, specialized tube firing burners such as the Eclipse Tube Firing Burner (TFB) are commonly used. The high velocity and tube firing burners, however, are available from many different manufacturers and several of the tube firing burner manufacturers also have an option to add flue gas recirculation (FGR) for reducing NOx emissions.

SCAQMD Staff reported in the Draft Technology Assessment that the emission test results as of January 2015 cover a variety of furnaces processing aluminum and steel alloys across a broad temperature range. Most of the heat treating furnaces tested met the Rule 1147 emission limit with their existing burners and it appears that only a few furnaces have either had their burners replaced, added an FGR system, or replaced their furnace in order to comply with Rule 1147. Despite the fact that new emission test results for kilns have not yet been received, emission tests completed on small and large kilns prior to rule adoption in 2008 and rule amendment in 2011 demonstrated compliance with a 60 ppm NOx emission limit.

ETS concurs that the 60 ppm NOx emission limit for the heat treating equipment category is technically feasible. ETS confirmed that most of the furnace NOx emission concentrations were in the range from 45 ppm to 55 ppm with an average of approximately 50 ppm in review of the 23 source test information for metal heat treating obtained from the SCAQMD Source Test Database as of January 2015 and the source testing demonstrates “achieved in practice”.

G. ETS Comments on Metal Melting

ETS conducted a review of the information presented in Appendix K of the Draft Technology Assessment regarding the metal melting furnace category. ETS concurs that the 60 ppm NOx emission limit for the metal melting equipment category is technically feasible, may be achievable with original burners, and that the source testing demonstrates "achieved in practice". The average NOx emissions of 42 ppm for the 8 larger metal melting furnaces tested and 54 ppm for the 5 small pot and crucible melting furnaces were confirmed by ETS in the SCAQMD Source Test Database as of January 2015.

H. ETS Comments on Multi-chamber Burn-off Ovens and Incinerators

ETS conducted a review of the information presented on page 2-3 and in Appendix L of the Draft Technology Assessment on multi-chamber burn-off ovens and incinerators. It was reported that 12 burn-off ovens, furnaces and incinerators have completed review of their test results and most units were tested with original burners. Review of the SCAQMD Source Test Database as of January 2015 confirmed that the average NOx concentration in the stack after the afterburner section was less than 45 ppm and the range was from 26 to 55 ppm. However, SCAQMD Staff had previously received inputs from Stakeholders (local manufacturers of burn-off furnaces and company representatives) to indicate that it is not possible to use the preferred type of burner and meet a 30 ppm emission limit in the primary chamber for a process temperature ≤ 800°F. Those particular burners are designed to have NOx emissions in the range of 40 to 60 ppm. ETS concurs that a 60 ppm NOx emission limit for both the primary and secondary chambers in this equipment category is technically feasible, may be achievable with the original burners, and that the source testing demonstrates "achieved in practice".

Also, based on the previously held discussions and assessments between SCAQMD and Stakeholders, ETS concurs with the following SCAQMD Staff recommendation for the multi-chamber burn-off ovens and incinerators category of equipment:

> Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators for all process temperatures (Staff Recommendation #3)

I. ETS Comments on Ovens and Dryers

ETS conducted a review of the information presented on page 2-3 and in Appendix M of the Draft Technology Assessment on ovens and dryers, which were reported to be the second largest category of equipment regulated by Rule 1147. The ovens and dryers are utilized in a variety of processes including curing of coatings and other materials, drying coated and printed products, and drying materials. There are a variety of burner types used in this equipment category with the most common type being nozzle mixing air heating burners manufactured by Eclipse and Maxon.

During the review of the SCAQMD Source Test Database, ETS also observed that approximately 66% of the 140 tested ovens and dryers used Maxon burners and approximately 25% used Eclipse burners. Over 50% of the Maxon burners tested were from the Cyclomax product line and almost 85% of the Eclipse burners tested were from the Winnox product line. ETS conducted a general search for other manufacturers of low NOx burners for very small, low temperature ovens and dryers that are designed to comply with a 30 ppm NOx limit, in addition to a detailed review of the aforementioned low NOx burner product line specifications. The smallest low NOx air heating burners designed to comply with the 30 ppm NOx emission limit that could be found by ETS were between 400,000 and 500,000 Btu/hour. For example, the Maxon packaged Cyclomax® burners are available in 5 sizes with the smallest burner size rated at 400,000 Btu/hour (Cyclomax Model Number 0.4M).[4] The Maxon packaged Ovenpak® LE burners were available in 10 sizes with the smallest burner size rated at 500,000 Btu/hour (LE 5).[5] The Eclipse Winnox burners were available in 8 sizes with the smallest burner size rated at 550,000 Btu/hour (Eclipse Model Number WX0050).[6]

ETS was able to find smaller sizes of low NOx burners; however, they were for high temperature applications such as heat treating furnaces and kilns. The available smaller burners for high temperature applications typically require multiple small burners and they are designed to have NOx emissions in the range of 40 to 60 ppm. As an example, Eclipse makes a "nozzle-mixing burner with a packaged blower that is designed to fire with fixed combustion air over a wide turndown range" called ThermAir. These burners are available in 9 sizes ranging from the smallest size of 150,000 Btu/hour to the largest size of 5,000,000 Btu/hour; however, the Eclipse product literature states the low NOx emissions are 60 ppm at high fire.[7]

It was reported that 140 units used for a variety of processes have approved test results and comply with the 30 ppm NOx limit. ETS' review of the SCAQMD Source Test Database as of January 2015 confirmed that the average NOx emission concentration for most ovens and dyers was about 20 ppm with a range of 4 ppm to 30 ppm. ETS concurs that the 30 ppm NOx emission limit for the ovens and dryers equipment category is technically feasible and can be achieved by available technology, with the exception of low NOx burners with a total rated heat input of less than 325,0000 Btu/hour, and that the source testing demonstrates "achieved in practice."

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[4] *Honeywell Maxon Product Catalog: Industrial Burners* (accessed September 20, 2016); available from https: //www.maxoncorp.com/Directory/product/CYCLOMAX-Low-NOx/24/Natural-Gas-Burner-Low.

[5] *Honeywell Maxon Product Catalog: Industrial Burners* (accessed September 20, 2016); available from https://www.maxoncorp.com/Directory/product_detail/OVENPAK-LE-natural-gas-lownox/113/.

[6] *Honeywell Eclipse Product Catalog: Air Heating Burners* (accessed September 20, 2016); available from www.eclipsenet.com/products/winnox/.

[7] *Honeywell Eclipse Product Catalog: Air Heating Burners* (accessed September 20, 2016); available from www.eclipsenet.com/products/thermair/.

ETS agrees with the SCAQMD Draft Technology Assessment which states that "there is a lower limit on the availability of low NOx burners for ovens and dryers" to meet a NOx emission limit of 30 ppm and concurs with the following SCAQMD Staff recommendation:

> Exempt new and existing in-use units with total rated heat input of less than 325,000 Btu/hour from the Rule 1147 NOx emission limit (Staff Recommendation #1)

As part of the research conducted by ETS for this project, another noteworthy item pertinent to this category of equipment from the previously referenced article by Matt Brueck of Maxon Corporation is the following:

> [8]Traditional oven burners have higher thermal turndowns than low emission oven burners. Because of this, low NOx oven burners should never be oversized. In the past, a larger-than-necessary burner may have been used without concern for overheating the oven at low fire. Now it is recommended that engineers look closer at an oven's heat balance, especially at low fire. In short, use the smallest low NOx burner possible for any application below about 5,000,000 Btu/hour.

J. ETS Comments on Food Ovens

It was reported in Appendix N of the Draft Technology Assessment that food ovens in use at the time SCAQMD Rule 1153.1 was adopted are no longer subject to Rule 1147. However, new food ovens are currently subject to Rule 1147 requirements. It also stated that Staff is currently evaluating alternative rule development options for exempting new food ovens from Rule 1147. ETS has no specific comments on the food ovens category of equipment and there were no Rule 1147 Stakeholder inputs received in regard to this specific category.

Upon review of the February 2016 Rule 1147 Draft Technology Assessment by major equipment category, ETS concurs with SCAQMD's three recommendations for proposed changes to Rule 1147 based on technical feasibility (Staff Recommendations #1, #2 and #3). ETS had one additional recommendation for a change to Rule 1147 based on technical feasibility for the Afterburner Technologies category of equipment discussed in Section VI.A above:

> Change the NOx emission limit in the afterburner technologies equipment category from 30 ppm to 60 ppm for processes that operate at or below 800°F
> (ETS Recommendation #6)

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[8] Brueck, Matt; <u>California Emissions Standards Met With Oven Retrofit</u>. *Process Heating*, May 1, 2002.

VII. ETS COMMENTS AND SUGGESTIONS ON COST AND COST EFFECTIVENESS ANALYSIS IN THE SCAQMD DRAFT TECHNOLOGY ASSESSMENT

A. ETS Comments and Suggestions on Cost Effectiveness

The basic methodology utilized for calculating cost and cost effectiveness in the SCAQMD Rule 1147 Draft Technology Assessment is consistent with prior SCAQMD rule development studies, including those that ETS has been contracted as an independent consultant to either prepare or review. As described on page 3-3 of the Draft Technology Assessment, SCAQMD BACT Guidelines and rule development use a discounted cash flow analysis to estimate the cost and cost effectiveness of emission control options. As stated in the BACT Guidelines for minor (non-major) sources, "the discounted cash flow method calculates the present value" (also referred to as net present value) "of the control costs over the life of the equipment by adding the capital cost to the present value of all annual costs and other periodic costs over the life of the equipment."

For the scenarios developed in the Draft Technology Assessment, a net present value was calculated for the control equipment using the total installed cost (which consists of the purchased equipment cost, shipping, tax, and installation costs) and annual costs. The minor source BACT Guidelines also state that "a real interest rate of four percent and a 10-year equipment life is used." However, it is noted by ETS in the SCAQMD Draft Technology Assessment that there is a key difference in the calculation of cost effectiveness between the BACT Guidelines and rule development. For rule development, such as the Rule 1147 Draft Technology Assessment, a best estimate of the equipment's useful life is used in the calculation of cost effectiveness instead of a fixed 10-year life assumption that is associated with financing of new equipment. An example is shown below by Equation 1, with a factor of 13.59 to estimate the cumulative annual operating costs during the 20-year life of a control device:

$$NPV = TIC + (13.59 \times AC) \qquad \text{(Equation 1)}$$

Where:

NPV = Net present value, $

TIC = Total installed cost, $

AC = Annual cost, $

As described in the SCAQMD minor source BACT Guidelines:

> "Cost effectiveness evaluations consider both capital and operating costs. Capital cost includes not only the price of the equipment, but the cost for shipping, engineering, and installation. Operating costs or annual costs includes expenditures associated with utilities, labor and replacement costs. Finally, costs are reduced if any of the materials or energy created by the process result in cost savings."

SCAQMD noted in the Draft Technology Assessment that "because the useful life of boilers, ovens and furnaces can be several decades, the costs of routine maintenance and equipment replacement unrelated to control equipment is not included in the cost effectiveness analysis of regulatory requirements to meet emission standards".

In terms of annual costs for the types of burners and combustion system components that were evaluated as part of the Draft Technology Assessment, ETS concurs with the exclusion of annual costs because ETS is unaware of specific items in the "Total Annual Cost" list found in Appendix D, Attachment 1-3 of the Draft Technology Assessment (Appendix A of this report) which would result in significant increases in annual expenditures for low NOx burners over the existing burner types. It is the opinion of ETS that maintenance of burner components is required for existing burner systems or new low NOx burner systems, so recurring costs for annual maintenance of retrofit burners would not be appropriate to include in the cost effectiveness analysis. Moreover, there are likely energy savings (gas and/or electricity) and rebate programs associated with the new equipment which would mitigate any potential increases in annual costs.

Accounting for the excluded annual costs, Equation 1 would be reduced to the net present value being equal to the total installed cost as shown below in Equation 2:

$$NPV = TIC \qquad \text{(Equation 2)}$$

The method utilized by SCAQMD Staff to calculate the total cost of replacing equipment, including shipping, tax, and installation costs as described on page 3-6 of the Draft Technology Assessment, is consistent with ETS' experience in using the EPA Air Pollution Control Cost Manual.

The cost effectiveness of the emission control equipment can then be estimated by dividing the net present value by the emission reduction benefit over the control equipment life (ex. 20-25 years). The cost effectiveness is shown in Equation 3 below in $/ton of NOx removed:

$$CE = NPV / (\text{Total NOx ER Over Project Life}) \qquad \text{(Equation 3)}$$

Where:

CE = Cost Effectiveness, $/ton

NPV = Net present value, $

ER = Emission Reduction, ton

SCAQMD Staff indicated on page 3 of the March 4, 2016 Board Letter (see Appendix A) that the current SCAQMD BACT Guidelines criteria for equipment that does not have a defined BACT was utilized as a guide to evaluate the cost effectiveness of low NOx retrofits for Rule 1147 equipment. ETS reviewed the "Maximum Cost Effectiveness Values" section of the SCAQMD Proposed Amended BACT Guidelines - Part C: Policy and Procedures for Non-Major Polluting Facilities (dated October 2016). The cost effectiveness criteria as found in the Proposed Amended BACT Guidelines are $26,910 per ton of NOx for average cost effectiveness and $80,590 per ton of NOx for the incremental cost effectiveness between two or more control options. These numbers were reported to be based on the criteria adopted by the SCAQMD Governing Board in the 1995 BACT Guidelines, adjusted to second quarter 2016 values using the Marshall and Swift Equipment Cost Index. Discussions in the body of the Rule 1147 Draft Technology Assessment then use the current numbers rounded up to $27,000 per ton and $81,000 per ton as a guide to evaluate cost effectiveness for the low NOx retrofits for Rule 1147 equipment.

ETS concurs that the utilization of the minor source BACT criteria of $27,000 per ton of NOx for average cost effectiveness and $81,000 per ton of NOx for incremental cost effectiveness is appropriate to use as a screening tool for small equipment with NOx emissions of one pound per day or less. However, as noted in the Draft Technology Assessment, "there is no single cost or cost effectiveness limit established by the SCAQMD Board for use in rule development, permitting, or other programs. Cost effectiveness for CARB and SCAQMD rules and programs differ and depend upon the program, the pollutant, the nature of the process and equipment affected and the types of feasible emission control options." For example, SCAQMD Staff indicated to ETS that thresholds for other SCAQMD rules including Rules 1146/1146.1 (which includes small businesses) and RECLAIM have been significantly higher with cost effectiveness criteria up to $50,000 - $60,000 per ton. Staff also indicated that the $27,000 per ton average cost effectiveness from the BACT Guidelines is not a threshold for rule development or any other program outside of a limited application for BACT (sources without defined BACT or an old BACT). Based on ETS' review of the Draft Technology Assessment, it appears that the $27,000 per ton was utilized as a screening tool for the small and low emission sources evaluated in the Draft Technology Assessment for Rule 1147 and was not considered as a threshold that should not be exceeded.

It was stated in the Rule 1147 Draft Technology Assessment that the calculation of cost and cost effectiveness for both Rule 1147 adoption and the 2011 amendment were done on a per burner basis. It further stated that the cost effectiveness analysis in that document focused on the cost and emission reduction per burner replaced utilizing the cost for a burner with an integrated blower. In general ETS concurs with the cost effectiveness methodology in the Draft Technology Assessment for the simple fact that for rules, calculations can't be performed for individual pieces of equipment used in every specific situation. A range of average cost effectiveness values for the following three types of burner categories identified in the Draft Technology Assessment: 1) Low Temperature Ovens and Dryers, 2) High Temperature Applications, and 3) Spray Booths. The different methods utilized by Staff for determination of the emissions reductions for those burner categories are described further in Section VII.B of this report.

As a result of the cost effectiveness analysis conducted in the February 2016 Draft Technology Assessment for Rule 1147, SCAQMD Staff made the following two recommendations for proposed changes to Rule 1147 based upon cost effectiveness considerations:

1. Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified, relocated or replaced (Staff Recommendation #4)

2. Delay compliance with the NOx emission limit for existing in-use spray booth until the heating system is modified or replaced or the unit is relocated (Staff Recommendation #5)

B. ETS Comments and Suggestions on Cost and Cost Effectiveness Data for Small and Low Emission Equipment

The ETS comments on the cost and cost effectiveness data for the specific categories of small and low emission equipment that were presented in the Rule 1147 Draft Technology Assessment may be found in the sections below:

1. **<u>Burner Cost and Cost Effectiveness for Low Temperature Ovens and Dryers:</u>**

   ETS reviewed both the "Summary of Low and High Temp Burner Costs" developed by SCAQMD (Confidential Information) and the cost and cost effectiveness information presented from pages 3-5 to 3-7 of the Draft Technology Assessment. The typical equipment costs ranging from \$7,500 to \$15,000 for packaged burners and combustion systems in the size range of 500,000 Btu/hour to 2,000,000 Btu/hour, respectively, were reviewed by ETS. Since the focus of this section dealt with the cost effectiveness for low temperature applications with emissions of one pound per day or less, the specific burner types and sizes evaluated by SCAQMD were appropriate and appeared to representative of typical costs. Also, SCAQMD utilized the higher end of the burner cost range (\$15,000) to perform the cost effectiveness evaluation displayed on page 3-6 of the Draft Technology Assessment.

   ETS is familiar with the EPA method utilized by the SCAQMD to calculate the total installed cost, which includes capital cost items such as shipping, tax, and installation costs in addition to the price of the equipment. The cost estimating factor of 2.0 was a conservative approach and included a contingency factor of 13% to address uncertainties in the cost estimation. A total installed cost of \$30,000 was then used to calculate the cost effectiveness for estimated emission reductions of 0.25, 0.50 and 0.75 pounds per day over 260 days per year and 20 years. This resulted in cost effectiveness numbers of \$46,154, \$23,077, and \$15,385 per ton, respectively. By using a midpoint of the cost effectiveness range for typical emission reductions of 0.25 to 0.50 pounds per day, SCAQMD arrived at a midpoint of \$34,500 per ton. The cost effectiveness of \$34,500 per ton to replace combustion systems for low emission ovens and dryers was greater than the SCAQMD minor source (non-major) BACT average criteria of \$27,000 per ton; however, it was less than the incremental criteria of \$81,000 per ton. SCAQMD Staff indicated to ETS that thresholds for other SCAQMD rules including Rules 1146/1146.1 (which includes small businesses) and RECLAIM have been significantly higher with cost effectiveness criteria up to $50,000 - $60,000 per ton.

ETS concurs that the cost of the replacement burners and combustion system components can vary (higher, as well as lower) depending upon which components must be replaced and many other site-specific factors. It was noted by SCAQMD in the Draft Technology Assessment that minor source BACT criteria applies to new sources only; however, ETS concurs that the criteria is appropriate to use as a screening tool for small equipment with emissions of one pound per day or less.

Based upon the review of the Draft Technology Assessment, ETS agrees that the cost effectiveness for some low temperature/low emission ovens and dryers to comply with the Rule 1147 NOx emission limit of 30 ppm may exceed the SCAQMD minor source BACT average criteria for NOx of $27,000 per ton for new sources without a defined BACT or an old BACT. Therefore, ETS concurs with the following SCAQMD Staff recommendation:

> Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified, relocated or replaced (Staff Recommendation #4)

2. **Burner Cost and Cost Effectiveness for High Temperature Applications:**

ETS reviewed both the "Summary of Low and High Temp Burner Costs" developed by SCAQMD (Confidential Information) and the cost and cost effectiveness information presented from pages 3-7 to 3-9 of the Draft Technology Assessment. The equipment costs for high temperature/low emission applications ranging from $5,000 to $15,000 per burner for applications up to 2,000,000 Btu/hour were reviewed by ETS. Since the focus of this section dealt with the cost effectiveness for high temperature applications with emissions of one pound per day or less, the specific burner types and sizes evaluated by SCAQMD were appropriate and appeared to be representative of typical costs.

ETS concurs that the cost of the replacement burners and combustion system components can vary (higher, as well as lower) depending upon which components must be replaced and many other site-specific factors. It was noted by SCAQMD in the Draft Technology Assessment that minor source BACT criteria applies to new sources only, however, ETS concurs that the criteria is appropriate to use as a screening tool for small equipment with emissions of one pound per day or less. SCAQMD Staff indicated to ETS that thresholds for other SCAQMD rules including Rules 1146/1146.1 (which includes small businesses) and RECLAIM have been significantly higher with cost effectiveness criteria up to $50,000 - $60,000 per ton.

Based upon the SCAQMD cost effectiveness analyses performed for this equipment class, ETS agrees that the cost effectiveness for high temperature/low emission units with emission reductions of less than 0.2 pound per day to comply with the Rule 1147 NOx emission limit of 60 ppm may exceed the SCAQMD minor source BACT average criteria for NOx of $27,000 per ton for new sources without a defined BACT or an old BACT. Therefore, ETS concurs with the following SCAQMD Staff recommendation:

> Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified, relocated or replaced (Staff Recommendation #4)

3. **<u>Heating System Cost and Cost Effectiveness for Spray Booths:</u>**

ETS reviewed the "Heating System Cost and Cost Effectiveness for Spray Booths" found on pages 3-9 and 3-10 of the Draft Technology Assessment and the vendor costing information collected by SCAQMD (Confidential Information). As stated in Appendix A-4 of the Draft Technology Assessment, "business owners and equipment vendors indicated typical automotive booths and many other booth operations have annual average emissions of less than one third pound per day."

Based on the Draft Technology Assessment, the cost information supplied by SCAQMD and reviewed by ETS supports the cost effectiveness calculation of a new low NOx SCAQMD certified auto repair booth to be at most $22,000 per ton. However, the cost effectiveness reviewed by ETS for retrofitting an existing in-use auto repair booth with an SCAQMD certified heating system was significantly higher, with a range of $66,000 to $80,000 per ton. The cost information supplied to SCAQMD by multiple equipment vendors for adding a new natural gas fired certified heating system (equipment plus labor) to an existing spray booth ranged from $30,000 to $50,000, depending upon manufacturer, type of booth and the individual installation. It was stated in the Draft Technology Assessment that "to use an SCAQMD certified burner on a used spray booth, the owner/operator must also install a new heater box, blower, other mechanical components with a new thermostat and control system for moving air in addition to installing the burner, mounting hardware and combustion control system."

It was noted by SCAQMD in the Draft Technology Assessment that minor source BACT criteria applies to new sources only, however, ETS concurs that the criteria is appropriate to use as a screening tool for small equipment with emissions of one pound per day or less. SCAQMD Staff indicated to ETS that thresholds for other SCAQMD rules including Rules 1146/1146.1 (which includes small businesses) and RECLAIM have been significantly higher with cost effectiveness criteria up to $50,000 - $60,000 per ton.

Since the cost effectiveness to retrofit existing in-use spray booths is greater than the minor source average cost effectiveness criteria of $27,000 per ton for equipment categories without a defined BACT or a very old BACT and may exceed the incremental criteria of $81,000 per ton, ETS concurs with the following SCAQMD Staff recommendation for the spray booth category of equipment:

> Delay compliance with the NOx emission limit for existing in-use spray booths until the heating is modified, relocated or replaced (Staff Recommendation #5)

Upon review of the cost and cost effectiveness analysis presented in the February 2016 Rule 1147 Draft Technology Assessment, ETS concurs with SCAQMD's two recommendations for proposed changes to Rule 1147 based upon cost effectiveness considerations (Staff Recommendations #4 and #5). ETS did not have any additional recommendations for changes to Rule 1147 based on cost effectiveness considerations.

VIII. ETS RESPONSES TO INFORMATION RECEIVED FROM RULE 1147 STAKEHOLDERS BY AUGUST 23, 2016 DEADLINE

This section summarizes the inputs, data, comments, and/or concerns that ETS received from Stakeholders at the Rule 1147 Task Force Meeting on August 3, 2016 and subsequent to the meeting, but prior to the August 23, 2016 deadline. The information received came from the following three Stakeholders: 1) Furnace Dynamics, Inc., 2) Industrial Process Equipment, Inc., and 3) Wirth Gas Equipment, Inc. ETS identified the information received from the three Stakeholders as nine distinct item numbers (Item #'s 1-9) by the date received. The ETS responses to the Rule 1147 Stakeholder information received by item number are also incorporated in this section.

A summary of the information received from the President of Furnace Dynamics, Inc. at the Rule 1147 Task Force meeting on August 3, 2016 may be found in Appendix C and copies of the four input items received from the Stakeholder are located in Attachments C-1, C-2, C-3, and C-4. Brief summaries of Stakeholder Item #'s 1-4 and the ETS responses are provided below:

A. Stakeholder Item #1 – Furnace Dynamics, Inc.

Stakeholder Item #1 (Attachment C-1) contains a letter from Furnace Dynamics, Inc. titled "A discussion on Potential to Emit (PTE)" with no specific addressee that is dated 11/19/15. The Stakeholder recommended more options for the determination and verification of NOx emissions of one pound per day or less other than PTE. An example case was presented from a large forge facility to try to compare the actual annual NOx emissions to the PTE. A series of charts were also included by the Stakeholder to try to convey the relationship of daily emissions vs. BTU input vs. hours of operation at a variety of different average firing rates.

<u>ETS Response to Item #1:</u> This Stakeholder letter is related to rule requirements and compliance issues and the Stakeholder is presenting a recommendation for different demonstration options for NOx emissions of one pound per day or less. These comments are not specific to the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

B. Stakeholder Item #2 – Furnace Dynamics, Inc.

Stakeholder Item #2 (Attachment C-2) contains a letter from Furnace Dynamics, Inc. titled "RE. Items of Concern Technology Assessment" that was addressed to Mr. Joe Cassmassi at SCAQMD and dated 02/18/16. The letter stated that the Stakeholder had conducted a cursory review of the Draft Technology Assessment and the Stakeholder provided comments on the following items:

Stakeholder Item #2-1: Cost Effectiveness: Excluded Costs (Burner Cans) – In this section of Item #2, the Stakeholder indicated that there was an exclusion of replacement components in burner systems. The Stakeholder had found that low NOx Eclipse Winnox burner cans need to be replaced, usually in 3-10 years with the cost of the can being between $2,500 - $5,000 plus installation which can run a couple of thousands.

ETS Response to Stakeholder Item #2-1: It is ETS' understanding that the Eclipse Winnox burners, along with other similar vendor models of low NOx nozzle-mixing air heating burners, typically have options for the material of construction of the burner can. Those options can be different types of alloys and a ceramic or refractory option depending upon the temperature of the process. Older, non-compliant burners had options for burner can construction as well. The selection of the proper burner can material of construction for the specific application is an important design consideration.

Additionally, there are specific manufacturer installation instructions and operational guidelines which may impact burner can life if not properly followed. For example, the Maxon Cyclomax Low NOx burner specification states that the burners should be operated with interrupted pilot and note that emissions can be 20% higher if the pilot is left on continuously and burner can life may be reduced.[9]

There were no details provided on the low NOx burner can issue, no other Stakeholders raised concerns regarding this matter to ETS, and the issue was presented by the Stakeholder as being a specific issue related to one particular manufacturer and equipment model. There were several other burner options presented in the Draft Technology Assessment capable of meeting the Rule 1147 NOx emission limits for this category of equipment, so ETS does not believe that it would be appropriate to include this issue in the calculation of average cost effectiveness for this category of equipment.

Stakeholder Item #2-2: Cost Effectiveness: Evaluation of cost effectiveness methods – In this section of Item #2, the Stakeholder stated that "Staff had indicated that the cost effectiveness was based on the differential between the cost of an existing burner and the cost of a new low NOx burner." The Stakeholder doesn't feel that this is a valid consideration since this is a replacement rule and would only apply to the very few cases where the existing burner was scheduled for replacement and not to the general population of equipment covered under Rule 1147.

[9] *Maxon Product Catalog: Cyclomax® Low NOx Burner Specifications* (accessed September 20, 2016); available from www.maxoncorp.com/Files/pdf/S-lt-cyclomax.pdf.

<u>ETS Response to Stakeholder Item #2-2:</u> If the Stakeholder's comments pertain to the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources that was released for public review on January 29, 2016, then this comment does not seem applicable. The average cost effectiveness analysis performed for the three types of burner categories defined in the Draft Technology Assessment that ETS reviewed <u>was</u> calculated based on the cost of a replacement burner. Please see Section VII of this report and the "Cost and Cost Effectiveness" section of the Draft Technology Assessment.

<u>Stakeholder Item #2-3:</u> Cost Effectiveness: Methods of Determining Cost Effectiveness – The Stakeholder commented that a single cost effective methodology should be utilized for all 1147 devices and recommends that the 2006 SCAQMD Best Available Control Technology Guidelines, Part C: Policy and Procedures for Non-Major Polluting Facilities be used.

<u>ETS Response to Stakeholder Item #2-3:</u> In the February 2016 Draft Technology Assessment that ETS reviewed, SCAQMD <u>did use the BACT guidelines</u> for conducting the cost effectiveness analysis. Please see Section VII of this report and the "Cost and Cost Effectiveness" section of the Draft Technology Assessment. As noted in both of those sections, the lifetime costs of emissions were used as opposed to the 10 year life that is described in the BACT guidelines. According to SCAQMD this was based on comments from industry representatives that the full life of equipment should be considered in rule development analysis.

<u>Stakeholder Item #2-4:</u> Cost Effectiveness: Maximum Acceptable Cost Effectiveness – The Stakeholder commented that the actual cost effectiveness should be considered on a case-by-case basis and there should be a fixed maximum cost effectiveness level established so it would not disproportionately affect small industries. The Stakeholder recommended an absolute value of $30,000/controlled ton.

<u>ETS Response to Stakeholder Item #2-4:</u> These Stakeholder comments are related to rule requirements and are not comments specific to the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources. Of particular note, however, the Stakeholder recommended criteria of $30,000, which is higher than the minor source BACT criteria of $27,000 per ton of NOx for average cost effectiveness that was utilized as a screening tool in the Draft Technology Assessment for small equipment with NOx emissions of one pound per day or less.

<u>Stakeholder Item #2-5:</u> Burners Mentioned: Turndown – The Stakeholder commented that they have had good results with Eclipse Winnox burners for low temperature recirculation types of ovens and they have all passed source tests. The Stakeholder then expressed concerns about an inherent problem of limited turndown with the new "low NOx" burners and provided an example where pretesting of a Cyclomax burner by the Stakeholder produced unacceptable results and the burner had to be replaced despite being "classified and purchased as a low NOx burner."

ETS Response to Stakeholder Item #2-5: While the specific burner ratings, process conditions, and pretesting data from the Stakeholder's example case are unknown, the following general responses to the comments in Item #2-5 are offered by ETS. As previously stated in Section VI.I of this report, the ETS review of the SCAQMD Source Test Database noted that approximately 66% of the 140 tested ovens and dryers used Maxon burners and approximately 25% used Eclipse burners. An additional statistic noted from the ETS review is that out of the 140 tested units in the ovens and dryers equipment category with approved test results complying with the 30 ppm NOx limit, approximately 33% of the units had Maxon Cyclomax burners and approximately 19% of the units had Eclipse Winnox burners. There have also been more Maxon Cyclomax burners tested with approved test results complying with the 30 ppm NOx limit at "Low Fire" conditions than the Eclipse Winnox burners. As stated in the Draft Technology Assessment, both of those nozzle mix low NOx burner product lines for low temperature applications were developed about 15 years ago. The Stakeholder's suggestion that the Maxon Cyclomax burner is not a viable low NOx burner option for the low temperature oven category does not appear to ETS to be substantiated.

Stakeholder Item #2-6: Burners Mentioned: Efficiency – The Stakeholder commented that claims of increased efficiency with the installation of new low NOx burners may be false and that decreased efficiency may occur due to the manufacturers having to use more excess air to lower flame temperatures and thus reduce NOx. The Stakeholder stated the following, "if the existing burner is ratio fired and the new burner has to use 60 – 80% excess air to achieve the emission reductions, the total gas usage can actually increase. This becomes a problem if the existing burner is just marginally over the 1147 limit, the new burner that is installed can actually put more pollution into the air even with lower NOx values due to efficiency losses."

ETS Response to Stakeholder Item #2-6: These Stakeholder comments are vague in nature and the scenario described does not provide enough detail to accurately assess what the Stakeholder is trying to convey. These comments are not specific to the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

Stakeholder Item #2-7: Other Burners Mentioned in the Technology Assessment – The Stakeholder comments that "other burners mentioned in the Technology Assessment (outside of the major manufacturers) are specific use burners and can only be used in very specific applications."

ETS Response to Stakeholder Item #2-7: Since a primary focus of the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources was to evaluate the technical feasibility of retrofitting small and low emission units to comply with Rule 1147 emission limits, ETS found the discussion of all of the burners mentioned to be relevant to the assessment. All of the "other burners" mentioned and the information provided on them in the Technology Assessment combined with the Source Testing Database as of January 2015, indicated that the NOx emission limits in Rule 1147 are technically feasible and have been achieved in practice (with the exceptions noted therein). Since there are specific applications identified in Rule 1147 and prior public comments have dealt with the concerns regarding burner availability, then the mention of those specific use burners and their applications certainly does seem to be relevant to the Draft Technology Assessment on the opinion of ETS.

<u>Stakeholder Item #2-8:</u> Section headings in the letter labelled **"Enforcement Considerations"**, **"Rule Compliance Date Issues"**, **"PTE"** and **"Mitigation Fee"**

<u>ETS Response to Stakeholder Item #2-8:</u> These sections are related to Rule 1147 compliance, enforcement, and potential future rule amendments and are not comments specific to the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

C. Stakeholder Item #3 – Furnace Dynamics, Inc.

Stakeholder Item #3 (Attachment C-3) from Furnace Dynamics, Inc. contains a one page sheet titled "SCAQMD Minor Source BACT Cost Effectiveness Calculation." The sheet has cost effectiveness calculations performed for a Smokehouse Afterburner listed as being rated at 260,000 Btu/hour.

<u>ETS Response to Stakeholder Item #3:</u> This item appears to have already been addressed on page 3-10 of the Draft Technology Assessment in the section titled "Afterburner Controlling Smoke and Odors from Smokehouse"; however, ETS would like to point out the following details:

- In the Smokehouse Afterburner example presented in the Draft Technology Assessment, the operating schedule of the equipment was confirmed with the company owner by an SCAQMD inspector to be 12 hours per day for three days a week and 4 hours per day for two days a week (44 hours total per week) as opposed to 1.55 hours per day for 5 days per week (7.75 hours total per week) as found in the Furnace Dynamics, Inc. Cost Effectiveness Calculation in Attachment C-3.
- In Attachment C-3 under the heading of "Equipment Costs", the Stakeholder has costs for the following items: permit to construct fee ($2,200), source test evaluation fee ($611), and source test ($3,000). In prior SCAQMD rule development studies, including those that ETS has been contracted as an independent consultant, the types of permitting and source testing fees included by the Stakeholder are typically not appropriate to include in the calculation of emission control equipment cost effectiveness. As stated in the Draft Technology Assessment, "compliance demonstration costs including emissions testing, recordkeeping and other costs beyond what is recommended by equipment manufacturers are included in the socioeconomic assessment for rule adoptions."
- In Attachment C-3 under the heading of "Annual Costs", the Stakeholder has a cost for an annual source test fee ($100/yr). ETS does not believe that the inclusion of an annual source test fee is applicable or appropriate for the cost effectiveness analysis of a burner retrofit with a low NOx burner. Furthermore, upon review of Rule 1147, ETS found no requirement for source testing beyond the first year, so it is not appropriate to include that as a recurring annual cost.

- In Attachment C-3 under the heading of "Annual Costs", there is a cost for periodic maintenance ($400/yr). There was no documentation provided with the sheet to indicate what the annual maintenance costs related to the replacement of the existing burner with a new low NOx burner represents. Also, there was no evidence provided that the annual maintenance costs were above and beyond the costs for a non-compliant burner system; therefore, it is not appropriate to include those costs in the cost effectiveness calculations.
- The cost effectiveness calculations were performed using an equipment life of 10 years. For an afterburner such as this, ETS finds an equipment life of at least 20-25 years to be more appropriate.

D. Stakeholder Item #4 – Furnace Dynamics, Inc.

Stakeholder Item #4 (Attachment C-4) from Furnace Dynamics, Inc. contains a one page sheet titled "SCAQMD Minor Source BACT Cost Effectiveness Calculation." The sheet has cost effectiveness calculations performed for an Afterburner listed as being rated at 5,000,000 Btu/hour.

ETS Response to Stakeholder Item #4: This item does not appear to be within the scope of the Draft Technology Assessment because the daily NOx emissions listed are 1.671 lbs/day. In addition, there is insufficient information provided to determine if the process, emissions, usage, operating hours, and other parameters are appropriate. Information from the owner's application for permit would have been helpful. As stated in the synopsis of the SCAQMD Board Meeting on March 4, 2016, "the rule requires staff to conduct a technology assessment and report to the Board on the availability of burner systems and heating units for processes with NOx emissions of one pound per day or less". The same comments provided above in Stakeholder Item #3 regarding additional fees that should not be included in the cost effectiveness calculations and the utilization of an equipment life of 20-25 years as opposed to 10 years are also applicable to this item (Stakeholder Item #4).

A summary of the information received from Rule 1147 Stakeholders subsequent to the Rule 1147 Task Force Meeting and by the August 23, 2016 deadline may be found in Appendix D and copies of the five input items received from the Stakeholders are located in Attachments D-1, D-2, D-3, D-4, and D-5. Brief summaries of Stakeholder Item #'s 5-9 and the ETS responses are provided below:

E. Stakeholder Item #5 – Industrial Process Equipment, Inc.

Stakeholder Item #5 (Attachment D-1) from Industrial Process Equipment, Inc. contains the product information sheet on an immersion tube burner line (Titan Industrial Heating Systems, Immersion Tube Gas Burners). The Titan Immersion Tube Gas Burner was an example of a type of immersion burner line in the heated process tanks, evaporators and parts washers' category of equipment that has been tested in the SCAQMD with NOx emission results below 60 ppm and was emailed to Industrial Process Equipment, Inc. by SCAQMD Staff at the Stakeholder's request.

ETS Response to Stakeholder Item #5: The time and date stamp were not displayed on the original email from SCAQMD Staff to the Stakeholder. ETS has no specific comments on the exchange between Stakeholders regarding this item because the context is unclear.

F. Stakeholder Item #6 – Industrial Process Equipment, Inc.

Stakeholder Item #6 (Attachment D-2) from Industrial Process Equipment, Inc. was supplied to ETS after a discussion with Stakeholders during the Rule 1147 Task Force Meeting held at SCAQMD Headquarters on August 3, 2016. ETS asked the Stakeholder if they could provide any specific cost information with regard to the immersion tube heating systems that were being discussed during the Task Force Meeting. The Stakeholder email stated that "an average burner replacement with a low nox burner is $27,000 plus AQMD permits, Source testing and Down time costs being the line is shut down and any city permits. Could be more money if they do not have enough gas pressure in there plant to service the new burner."

ETS Response to Stakeholder Item #6: There was no supporting documentation or detail provided along with the average burner replacement cost of $27,000. The specific burner model number, burner size, burner cost, and installation costs were not supplied for verification by ETS.

G. Stakeholder Item #7 – Wirth Gas Equipment, Inc.

Stakeholder Item #7 (Attachment D-3) contains a letter from Wirth Gas Equipment, a supplier of industrial combustion equipment, which conveyed three areas of concern regarding SCAQMD's assessment of the "Burner availability and feasibility to retrofit units."

Stakeholder Item #7-1: The first area of Stakeholder concern in the Draft Technology Assessment was regarding SCAQMD's recommended "exemption for burners with a maximum rated capacity of 325,000 Btu/hour or less and "the delay or exemption for equipment that produces **<** 1lb. of NOx emissions per day." The Stakeholder states that "if this is in fact the criteria I suggest they make the exemption for all processes/equipment at this level."

ETS Response to Stakeholder Item #7-1: If ETS' comprehension of the Stakeholder's first area of concern is correct, then it appears that SCAQMD has already made recommendations in the Draft Technology Assessment to address the issues raised in Stakeholder Item #7-1. Please see Table ES-1 of this report for Staff Recommendation #1 which was based on technical feasibility and Staff Recommendation #5 which was based on the cost effectiveness evaluation.

Stakeholder Item #7-2: The second area of Stakeholder concern was Staff Recommendation #2 for the heated process tanks, evaporators and parts washers' category of equipment in the Draft Technology Assessment. The Stakeholder stated that "in exempting existing units from meeting a **<** 60 ppm requirement they are acknowledging that a good replacement piece of equipment does not exist. They state their testing has identified three types of heating systems that comply with the NOx emission limit and yet do not specifically identify what these systems are.....It is my opinion that not only a good replacement burner does not exist to meet the required firing conditions for immersion heating, but a good immersion burner that will meet a **<** 60 ppm NOx requirement for new units does not exist. The only unit I am aware of, which is available from a division of our principal company, requires firing tubes that are four times larger than current standard equipment. Using this "low NOx" option requires a tank that needs to be four times deeper to accommodate the tube."

ETS Response to Stakeholder Item #7-2: After reviewing the Draft Technology Assessment, it is ETS' understanding that the reason for Staff Recommendation #2 (see Table ES-1) was to address specific Stakeholder comments that it might not be technically feasible to retrofit certain types of existing heated process tanks with different burners that would meet the 60 ppm NOx emission limit. ETS reviewed both the Draft Technology Assessment, Appendix I (which discusses the heat process tanks, parts washers and evaporators category of equipment) and the SCAQMD Source Test Databases as of January 2015 (containing confidential information) and can confirm that the three types of heating systems that comply with the NOx emission limit of 60 ppm were in fact identified in Appendix I on pages I-2 and I-3.

Additionally, Appendix I of the Draft Technology Assessment identifies the new low NOx Maxon XPO burner for immersion heating that has been installed in new heated tanks with a 3,300,000 Btu/hour burner which demonstrated emissions of 4 ppm NOx at high fire and 34 ppm low fire in an SCAQMD approved emissions test. It should be noted that a comparison drawing presented to ETS by Industrial Process Equipment, Inc. in Stakeholder Item #8 depicts sizing information which contradicts this Stakeholder's claim of the firing tube being as much as four times larger and the tank being four times deeper.

Note: Additional comments regarding an acceptable immersion tube heating burner for parts washer tanks that would meet a NOx emission limit of 60 ppm were also brought up by two other Stakeholders, Industrial Process Equipment, Inc. and Furnace Dynamics, Inc. and those comments may be found in Stakeholder Item #8 (see Attachment D-4) and Stakeholder Item #9 (Attachment D-5), respectively.

Stakeholder Item #7-3: The third area of Stakeholder concern is that "exempting existing units until the tank is modified or replaced encourages industry to continue to use old, outdated, in-efficient equipment as long as possible. Additionally it does not honestly address the need for new equipment and falsely supports the suggestion that equipment to meet this requirement in a properly engineered design exists."

ETS Response to Stakeholder Item #7-3: It is unclear to ETS what type of suggestion, recommendation, or change to Staff Recommendation #2 from the Draft Technology Assessment for Rule 1147 that the Stakeholder is making in this third area of concern.

H. Stakeholder Item #8 – Industrial Process Equipment, Inc.

Stakeholder Item #8 (Attachment D-4) was a packet of information from Industrial Process Equipment, Inc. that was mailed to ETS and received on August 23, 2016. The packet contained a letter titled "Attention: Rule 1147" and manufacturer information was provided on the following burners: Eclipse ImmersoJet (IJ), Maxon Tube-O-Therm, Maxon XPO Immersion, Titan Immersion Heater. Comparison drawings of heated washer tanks with an Eclipse IJ6 burner tube arrangement and a Maxon XPO burner, including a washer Btu/hour burner sizing worksheet were also included in the packet.

Stakeholder Item #8-1: The Stakeholder stated in the letter that "in one of the meetings they changed the oven burners from 20 ppm to 30 ppm due to the fact there were no burners that would comply."

ETS Response to Stakeholder Item #8-1: The reference to a 20/30 ppm limit for oven burners does not appear to be relevant for the heated process tanks, evaporators and parts washers category of equipment since it has a completely different NOx emission limit in Rule 1147 (60 ppm or 0.073 lb/mmBtu). It should be noted; however, that ETS' review of the SCAQMD Source Test Database as of January 2015 confirmed that the average NOx emission concentration for most ovens and dyers tested (140 units) was about 20 ppm with a range of 4 ppm to 30 ppm.

Stakeholder Item #8-2: The Stakeholder stated in the letter that "the washer burners did not get the same attention. I feel the tube fired washer burners should be exempt along with other burners in this category or change the rule to 100 PPM."

ETS Response to Stakeholder Item #8-2: ETS was tasked with performing an independent review and analysis of the technical information presented in the Draft Technology Assessment for Rule 1147. In regard to the heated process tanks, evaporators and parts washers' category of equipment, it is ETS' understanding that SCAQMD Staff has already proposed a change to Rule 1147 based on Stakeholder concerns that it might not be technically feasible to retrofit an existing heated tank with different burners. The proposed change is to "delay compliance with the NOx emission limit for existing in-use heated process tanks, evaporators and parts washers with an integrated heated tank until such time the combustion system or tank is modified, replaced, or relocated." See Staff Recommendation #2 in Section V. of this report.

It was verbally reported to ETS (by the Stakeholder) that the ideal parts washer systems are designed for 2 to 3 mmBtu/hour and testing of some existing units indicates that current NOx emission levels range from 90 to 100 ppm for the high pressure burner system identified; however, no specific data or source testing information was supplied to ETS by the Stakeholder for review of actual emissions. It was also reported in the Draft Technology Assessment, Appendix I (which discusses the heat process tanks, parts washers and evaporators category of equipment) that there are currently no emission test results available for the types of tube heating system burners that produce higher pressures and can fire into smaller diameter tubes. It is unclear to ETS why the test results have not been submitted for any of these types of burners to date.

It is ETS' understanding through discussions with SCAQMD and as stated in the Draft Technology Assessment for Rule 1147 that under both federal and state law, SCAQMD cannot exempt equipment when it has a requirement under an existing rule and/or there is technology available for new units to meet the limit. Furthermore, it is understood by ETS that for Title V facilities (major sources), these types of processes will have to meet the NOx emission levels that have been demonstrated by systems with the Maxon XPO burners (30-35 ppm) since the emission level has been achieved in practice. Even a limit of 60 ppm NOx is significantly less stringent than other SCAQMD emission limits for boilers, water heaters, and process heaters which can range from 6 to 20 ppm NOx at 3% O_2.

Stakeholder Item #8-3: **Eclipse IJ Burner** - The Stakeholder provided product information and specification sheets from the Eclipse website on ImmersoJet (IJ) nozzle-mix tube-firing burners for Models IJ-8, Version 2 and IJ-6, Version 2 dated 4/5/2013. Also included were "Emissions Data Request" sheets from the Eclipse Home Office to the Stakeholder with guaranteed NO_x emission values that were dated as 6/19/2001 to 6/22/2001 and ranged from 80 to 90 ppm @ 3% O_2.

ETS Response to Stakeholder Item #8-3: ETS' prior experience indicates that many manufacturers are reluctant to guarantee burners to a lower NOx emission limit than is required by BACT or a rule and these guarantees were dated as being from June 2001. Were the "newer" Eclipse IJ Version 2 Models even available in 2001? ETS noticed a discrepancy between the Eclipse Product Datasheet for the ImmersoJet Burner, Model IJ-8, Version 2 that was provided in the packet from the Stakeholder (print date of 8/20/2016) and the Eclipse Emissions Data Request Sheet (dated 6/22/2001) with a NOx guarantee value of 80 ppm @ 3% O_2.

According to the Eclipse Design Guide for Immersion Burners (ImmersoJet Series, Version 2), the number in the Model signifies the immersion tube size in inches (i.e., Model IJ-8 Burner has a tube size of 8").[10] The Product Datasheet provided by the Stakeholder for the Model IJ-8 Burner lists 2 available burner maximum input ratings (firing rates) of 3,500,000 Btu/hour with the packaged blower and 4,800,000 Btu/hour with the remote blower; however, the corresponding Eclipse Emissions Data Request Sheet (dated 6/21/2001) that was attached to the IJ-8 Product Datasheet lists the burner model as IJ-6 v2, the burner firing rate as 3,000,000 Btu/hour, and the burner location as being an 8" Immersion Tube. It should also be noted that the Eclipse Product Datasheet for the Model IJ-6, Version 2 supplied by the Stakeholder lists a maximum input of 2,500,000 Btu/hour for the high pressure packaged blower and the only option for a maximum input that is greater than or equal to 3,000,000 Btu/hour for the Model IJ-6 burner is the option with a remote blower, which has a maximum input of 3,600,000 Btu/hour. These discrepancies will be discussed further in Stakeholder Item #8-5.

[10] *Honeywell Eclipse Product Catalog: Tube Firing Burners* (accessed September 20, 2016); available from www.eclipsenet.com/products/immersojet/.

Stakeholder Item #8-4: Maxon XPO Immersion Burner Tube Diameter and Efficiency - The Stakeholder provided the Technical Catalog for the Maxon XPO Burners and stated that "problems with retrofits and even new applications for this type of new burner is the first 8 feet of the fire tube is 24" in diameter versus the Eclipse IJ 8" tube diameter, 3,000,000 Btu/hour." The Stakeholder commented that the small tubes, such as the 8" diameter Eclipse IJ and Maxon Tube O Therm are more efficient (80%) than the old style larger diameter burners (69%).

ETS Response to Stakeholder Item #8-4: The Stakeholder claims regarding efficiency do not make sense to ETS. As stated in the Eclipse Immersion Burner (ImmersoJet Series, Version 2) Design Guide referenced in the ETS Response to Item #8-3,

> "efficiency is determined by the effective tube length. The diameter of the tube has little influence on the efficiency. At a given burner input, the net input to the tank is higher for a longer tube than for a relatively short tube. It is customary to size conventional immersion tubes for 70% efficiency, a reasonable compromise between fuel economy and tube length. However, small diameter tubes occupy less tank space than conventional tubes, so their length can easily be increased to provide efficiencies of 80% or more."

The Maxon XPO immersion burners, however, are a "new" style of indirect fired low temperature burners for use in liquid backed applications, including: water back heater, fire tube boiler, thermal oil heater, direct contact water heater, solution heating/tanks, and snow melters that will achieve ultra low NOx emissions while operating at 30% excess air level.[11] Due to the need for the burners and heat exchangers (tubes) to be designed as one integrated system in the heated process tank category of equipment and the fact that the burner tubes are typically a customer-supplied item, this is likely the reason that guarantees of emissions are not stated or implied in the burner manufacturer's general product literature.

Stakeholder Item #8-5: Comparison Drawing of Parts Washer Tank Layout with the Eclipse IJ6 Burner Tube Arrangement and a Maxon XPO Burner – The Stakeholder stated that the Maxon XPO burner is not a good solution for a new application since the tank would have to be significantly deeper, thus requiring more water and more heat input to heat the water. Additionally, the Maxon XPO heat exchange layout could not be well accommodated in wash tank applications, it has not been achieved in practice on enough pieces of equipment, and the wash tank applications should be exempted from the rule.

ETS Response to Stakeholder Item #8-5: The comparison drawing that was provided by the Stakeholder is labeled as "Eclipse Burner IJ 6" Immersojet Packaged Blower High

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[11] *Honeywell Maxon Product Catalog: Low NOx Burners* (accessed September 20, 2016); available from https://www.maxoncorp.com/Directory/product_detail/XPO-Burner-Low-NOx/443/?ex=jqf0jt-li1r2l-ef151a.com/Directory/product_detail/OVENPAK-LE-natural-gas-lownox/113/.

Pressure, Burner Output Max 3,000,000 BTU's"; however, the washer tank layout drawing for the Eclipse burner arrangement depicts an 8" diameter stainless steel tube in the parts washer as opposed to a 6" diameter tube that is typically indicative of the IJ 6 Model burner. Irrespective of the differences noted, the overall dimensions of the washer tank for the Eclipse IJ 6 burner tube arrangement in the Stakeholder's comparison drawing were 19'-11" long x 7'-⅝" wide x 39" tall, with a water level depth of 34".

The other wash tank on the comparison drawing provided by the Stakeholder was labeled as "XPO Maxon Burner, Burner Output Max 3,000,000 BTU's", with the fire tube of the XPO burner shown as 24" in diameter for the first 8' feet of tube length and the remaining tube depicted as 8" in diameter. The overall dimensions of the washer tank for the Maxon XPO burner tube arrangement were 19'-11" long x 8'-2⅝" wide x 45" tall, with a water level depth of 40".

On the assumption that the design and sizing of the immersion tubes for each of the parts washer tanks was accurate, ETS noted the following between the layouts of the Eclipse IJ6 burner and the Maxon XPO burner:

- The overall length of both parts washers were identical at 19'-11"
- The parts washer layout for the Maxon XPO burner arrangement was 1'-2" wider than the overall width of the parts washer layout for the Eclipse IJ 6 burner
- The Maxon XPO burner tube depicted was 24" in diameter for the first 8' of tube length and the remaining tube length was 8" in diameter; however, the Eclipse IJ tube diameter depicted was 8" for the entire tube length. Note: The Maxon XPO Technical Catalog included by the Stakeholder indicated that the inside diameter of the fire tube for the 3,000,000 Btu/hour (maximum capacity) burner that was selected could be between 18 and 24" in diameter based on manufacturer suggested heat flux values (Btu/in^2). ETS also noted in the Technical Catalog that for the 3,000,000 Btu/hour Maxon XPO burner the corresponding blast tube listed was 6" outside diameter by 4' in length.
- The parts washer overall height of the Maxon XPO burner layout depicted was 6" taller than the Eclipse IJ6 parts washer. There was also a 6" difference in water level depth between the Maxon XPO and Eclipse IJ6 parts washers.

The differences that ETS noted above between a parts washer tank with an Eclipse IJ6 burner and a parts washer tank with a Maxon XPO burner in the Comparison Drawing provided by Industrial Process Equipment, Inc. in Stakeholder Item #8 seem to contrast with the comments made by another Stakeholder in Item #7. The comments made by Wirth Gas Equipment, Inc. in Stakeholder Item #7 were the following: "The only unit I am aware of, which is available from a division of our principal company, requires firing tubes that are four times larger than current standard equipment. Using this "low NOx" option requires a tank that needs to be four times deeper to accommodate the tube."

Also in response to Stakeholder Item #8-5, the information and data presented by SCAQMD Staff in Appendix I of the Draft Technology Assessment regarding the Maxon XPO burner states that both heated process tanks and parts washers have been permitted with this burner. It further states that an SCAQMD approved emissions test on one of these systems (required for Regulation XIII and new source review) with a 3,300,000 Btu/hour burner had emissions of 4 ppm NOx at high fire and 34 ppm at low fire. This data suggests to ETS that for new systems, the emission limit of 60 ppm is certainly technically feasible and has been "achieved in practice".

Stakeholder Item #8-6: Titan Heater – Information was supplied by the Stakeholder from the Titan Industrial Heating Systems website with a paragraph highlighted on Downdraft Burners which stated that "the down draft gas burner system is for heating: Phosphates Waste Water Hot Seal tanks and many other applications." The Stakeholder comments related to the Titan Heater were that the maximum firing rate is 450,000 Btu/hour. The Stakeholder then stated that "most of our washers are 2,000,000 Btu/hour or more. The tube diameter is 4" to 6". You would need 5 burners and tubes to do 2,000,000 Btu/hour. Not a practical or efficient design…This is an old style application. Goes back to the first washer ever built."

ETS Response to Stakeholder Item #8-6: ETS does not understand the relevancy of the Stakeholder comments on the Titan burner to the Rule 1147 Draft Technology Assessment. Appendix I of the Draft Technology Assessment lists the burner manufactured by Titan as one of many manufacturers of burners for the most common type of heating tube system that typically has tubes that vary from about 4" up to 14" in diameter (one of the five different types of tank heating systems described in Appendix I). The Draft Technology Assessment then states that three of the manufacturer systems within this type of tank heating system, which all use a burner with a maximum rating of 350,000 Btu/hour and 4 inch diameter heating tubes, have been tested with NOx emissions that range between 30 to 55 ppm and meet the NOx emission limit of 60 ppm for this category of equipment. ETS did not find that the Draft Technology Assessment implied that this type of burner would necessarily be the most suitable design for the Stakeholder's specific application as described above. That type of tube heating system was also not described as using burners which produce higher pressures and can fire into smaller diameter tubes such as the part washer burners that the Stakeholder is referring to. However, ETS does find it noteworthy that an "old style" partial premix burner system, such as the Titan burner, was capable of achieving NOx emissions of less than 60 ppm for the specific application in which it was tested.

Stakeholder Item #8-7: BTUs out of California Information – This Stakeholder item contained a list (labelled "BTUs out of California Information") of California companies that reportedly have shut down or moved out of California due to the costs of doing business in the state.

ETS Response to Stakeholder Item #8-7: While ETS recognizes the economic impacts of companies moving or going out of business, the supplied information could not be analyzed as a part of the review of the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

NOTE: Additional comments regarding an acceptable immersion tube heating burner for parts washer tanks that would meet a NOx emission limit of 60 ppm were also brought up by two other Stakeholders, Wirth Gas Equipment, Inc. and Furnace Dynamics, Inc. and those comments may be found in Stakeholder Item #7 (see Attachment D-3) and Stakeholder Item #9 (Attachment D-5), respectively.

I. Stakeholder Item #9 – Furnace Dynamics, Inc.

Stakeholder Item #9 (Attachment D-5) contains an e-mail with the subject line "Tech Assessment" and an attachment file titled "Tech Assessment Complete.pdf" (16 pages). The file included a write-up with regard to the SCAQMD Draft Technology Assessment, a comprehensive evaluation of a company that is now in compliance with the rule (Exhibits A through I of Stakeholder file), additional comments regarding a couple of other applications, and a cost effectiveness spreadsheet for an auto body spray booth (Exhibit J of Stakeholder file). Note: Stakeholder Item #9, Exhibits A - J were excluded from Attachment D-5 in this report due to the Stakeholder's request to maintain company confidentiality regarding financial information.

Stakeholder Item #9-1: Technology Assessment – The Stakeholder expressed concern over the vast array of devices in Rule 1147 that are covered by the Technology Assessment and a database received by Staff containing approximately 270 categories of equipment and approximately 6,500 devices. The Stakeholder concerns were stated in regard to the "limited ETS contract value" which would make it "impossible to evaluate a large number of sources."

ETS Response to Stakeholder Item #9-1: It appears to ETS that the Stakeholder concerns over 270 categories of equipment covered by the "Technology Assessment" are in reference to a different earlier document or search of the SCAQMD permit database and not the February 2016 version of the Draft Technology Assessment for Rule 1147 which ETS was tasked with reviewing. The February 2016 Draft Technology Assessment clearly states that "ten major categories of equipment were evaluated through the technology assessment" with the focus of the report on "equipment with NOx emissions of one pound per day or less." In addition, it is ETS' understanding that it would not be appropriate to do individual cost effectiveness calculations for pieces of equipment on a case-by-case basis as part of a rule requirement; rulemaking uses averages for calculating emissions for categories of equipment. Furthermore, the February 2016 Draft Technology Assessment described in detail the methodology utilized, including writing out the equations for the cost effectiveness analysis of replacing burner systems in three types of burner systems for small equipment with estimated emissions of one pound per day or less for which ETS was tasked with reviewing. Within each of the three types of burner systems defined (low temperature ovens and dryers, high temperature applications, and spray booths), the Draft Technology Assessment described the range of typical replacement burner and combustion system component costs from confidential information provided by the vendors for the various types of equipment that would be subject to Rule 1147.

Stakeholder Item #9-2: General Comments Regarding the Technology Assessment– There were 3 separate comments discussed by Furnace Dynamics, Inc. in Item #9-2 as listed below:

Item #9-2-a: The Stakeholder expressed concerns regarding burner manufacturers providing guarantees for NOx emissions on a burner in a forge company furnace; however, none would guarantee an acceptable uniformity survey required by the aerospace industry.

ETS Response to Stakeholder Item #9-2-a: This item does not appear to be a comment on the Rule 1147 Draft Technology Assessment dated February 2016.

Item #9-2-b: The Stakeholder had concerns regarding an acceptable immersion tube burner that can be used in wash tanks.

ETS Response to Stakeholder Item #9-2-b: These comments were very similar in nature to comments made by two other Stakeholders, Wirth Gas Equipment, Inc. and Industrial Process Equipment, Inc., in regard to the heated process tanks, evaporators and parts washers' category of equipment. The ETS responses may be found in Stakeholder Item #'s 7 and 8 above.

Item #9-2-c: The Stakeholder included a cost effectiveness spreadsheet that relates to a typical auto body spray booth retrofit application with a comparison of "PTE" and "Actual" cost effectiveness calculations (Exhibit J).

ETS Response to Stakeholder Item #9-2-c: It is unclear why the Stakeholder included cost effectiveness calculations for an auto body spray booth retrofit because a recommendation was already presented by SCAQMD Staff in the Draft Technology Assessment for the spray booth category of equipment in consideration of cost effectiveness. The Staff recommendation was to delay compliance with the NOx emission limit for existing in-use spray booths until the heating is modified, relocated or replaced (Staff Recommendation #5). ETS did note in the Stakeholder cost effectiveness spreadsheet, however, that the total equipment cost to retrofit an existing auto body spray booth to meet the Rule 1147 NOx emission limit was listed as $26,000, which is slightly less than the Draft Technology Assessment range of $30,000 to $50,000.

Stakeholder Item #9-3: ETS Consulting – The Stakeholder comments in this section of Attachment D-5 were regarding a discussion during the Rule 1147 Task Force Meeting held on August 3, 2016. The comments pertained to the Stakeholder's opinion of how the emissions values and cost effectiveness for Rule 1147 should have been conducted from the outset of rule development.

ETS Response to Stakeholder Item #9-3: - This Stakeholder comments are not related to the February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources that ETS was tasked with reviewing.

Stakeholder Item #9-4: Pretesting to Determine the Current State of Compliance – The Stakeholder commented that over the last 3 years they have conducted approximately 190 pretests with the most advanced emission analyzers on the market (Testo 350) with 98% of the tests conducted on Rule 1147 devices.

ETS Response to Stakeholder Item #9-4: ETS reviewed the pretesting data that was presented with Stakeholder Item #9 (Exhibit A) and had follow-up questions and clarifications for the Stakeholder to gain a better understanding of how the pretesting data was utilized for the starting NOx emissions in the "Actual" cases of cost effectiveness conducted by the Stakeholder. Responses from the Stakeholder to the ETS follow-up questions were received in a timely fashion; however the follow-ups continued until September 12, 2016. ETS understands the importance of proper tuning and regular maintenance on combustion equipment to ensure that optimal conditions are being achieved and the utilization of portable analyzers may be a useful tool for many equipment owners to assess if compliance with Rule 1147 can be achieved with existing burners; however, the use of the pretesting data as the starting NOx emissions in the cost effectiveness for the "Actual" cases does not seem appropriate and will be addressed in additional ETS responses below.

Stakeholder Item #9-5: Facility Evaluation, Cost Effectiveness, and Actual Numbers vs. Default Values – The Stakeholder selected a facility where extensive pretesting was conducted in order to determine the compliance status for a specific facility and provide a basis for them to embark on a retrofit program prescribed under Rule 1147. The Stakeholder acquired a spreadsheet of the facility costs associated with each retrofit conversion that was determined as being needed based upon the pretesting data and the hours per day of operation. The Stakeholder then used the values as a basis of comparing the existing emission values and thus the overall reduction to calculate the cost effectiveness of each device. The average firing rates of the ovens, derived from actual source testing data, were used as the average firing rates of each of the ovens evaluated. The Stakeholder stated that it was important to understand that the indicated average was relevant to the understanding of how the equipment actually operates and then gave a description of that operation (see Attachment D-5).

The Stakeholder provided cost effectiveness charts for a specific facility and individual equipment where upgrades (burner retrofits) to their equipment were made and source testing was successfully completed. The Stakeholder stated "to assure consistency with staff's methodology, I created a spreadsheet using the same formulas found in the Districts Minor Source BACT Guidelines and the same values that are illustrated in the guidelines to assure the methods are consistent with what staff used in the initial evaluation. Staffs' and our numbers compare to the exact same dollar per controlled ton."

The Stakeholder also felt it important to provide actual numbers that represented actual information relating to specific devices. The Stakeholder stated that he had "used the actual starting ppm for each device to show a comparison to the Districts default values. The approach was to look at the actual daily use in hours then use a value that would represent the District's approach of using 100% firing rate for the normal hours of operation and also using the default emission factor that the staff used of 130#/MMcf natural gas (101.4 ppm).

ETS Response to Stakeholder Item #9-5: ETS conducted an extensive review of Exhibits A – I provided by the Stakeholder (which contained facility confidential information and were not included as an attachment to this report). It appears to ETS that the Stakeholder comments regarding the creation of a spreadsheet "to assure the methods are consistent with what staff used in the initial evaluation are in reference to an evaluation conducted by SCAQMD for Rule 1147 adoption in 2008. It is ETS' opinion that the Stakeholder's cost effectiveness calculations for individual pieces of equipment **are not consistent** with the cost effectiveness analysis presented by SCAQMD in the February 2016 version of the Draft Technology Assessment for Rule 1147 which ETS was tasked with reviewing.

After conducting an extensive review of the February 2016 version Draft Technology Assessment cost effectiveness calculations, ETS could not determine where the use of a default emission factor of 130#/MMcf natural gas (101.4 ppm) as commented by the Stakeholder was applicable. ETS did note in Appendix C, page C-2 of the Draft Technology Assessment dated February 2016 that "most rule 1147 emission test results are adjusted by the testing company or SCAQMD Staff to address issues with a test's acceptable range or with other testing and calculation issues. As a result, most test results can demonstrate compliance but cannot be used to accurately estimate concentration or mass emissions from individual units and categories of equipment."

The Stakeholder performed side-by-side cost effectiveness calculations with a column on the left of each page listed as "PTE" and a column on the right of each page listed as "Actual" for 6 pieces of equipment that would fall under the category of Small Ovens and Dryers as described in various sections of the Draft Technology Assessment. The NOx emission reductions for the "PTE" cost effectiveness calculations were calculated from the starting NOx emissions of 101.4 ppm and the "modified source emissions" of 30 ppm using 100% firing rate for the normal hours of operation for each of the 6 pieces of equipment. The NOx emission reductions for the "Actual" cost effectiveness calculations were calculated based on the Stakeholder pretesting data and "modified source emissions" of 30 ppm using an average firing rate for the normal hours of operation for the 7 pieces of equipment. Note: For calculating actual emission reductions, the Stakeholder should have used actual low NOx burner emissions instead of a default emission limit of 30 ppm. Actual low NOx burner emissions provided by the Stakeholder were in the range of approximately 7 to 20 ppm NOx.

The focus of the February 2016 Draft Technology Assessment was on processes with NOx emissions of one pound per day or less as called for on page 1147-16 of SCAQMD Rule 1147 – NOx Reductions from Miscellaneous Sources (Adopted December 5, 2008) (Amended September 9, 2011). For the cost effectiveness analysis performed for both the low temperature ovens and dryers and the high temperature applications, SCAQMD started with the NOx emissions of one pound per day and then performed the cost effectiveness calculations using NOx emission reductions in increments of 0.25 pounds per day for the following cases: 0.25, 0.50 and 0.75 pounds per day. Note: The initial NOx emissions from the equipment examples provided by the Stakeholder appeared to be above one pound per day from equipment that was more than 20 years old.

In addition, it is ETS' understanding that it would not be appropriate to do individual cost effectiveness calculations for pieces of equipment on a case-by-case basis as part of a rule requirement; rulemaking uses averages for calculating emissions for categories of equipment. Based on the responses given above, ETS does not believe that the Stakeholder's cost effectiveness calculations affect the recommendations that were made by SCAQMD Staff in the February 2016 Draft Technology Assessment. However, there were several key items that were gleaned from ETS' review of the all of the Exhibits provided by the Stakeholder in Item #9 that will be listed at the end of this section.

Stakeholder Item #9-7: Cost Effectiveness Methodologies – The Stakeholder commented that "there were multiple values illustrated in the technology assessment. They varied in duration of the starting and ending points. Some had a 10-year cost effectiveness value and some had 15 year or even a 20 year criteria used for the evaluation of cost effectiveness." The Stakeholder believes a singular methodology should be utilized for determining cost effectiveness and should be uniform for all Rule 1147 devices, should be conducted on a case-by-case basis, and the Stakeholder has offered to assist in streamlining this effort.

ETS Response to Stakeholder Item #9-7: The cost effectiveness values that ETS reviewed in the February 2016 version of the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources for the three types of burner systems previously defined utilized the following equipment lives:

- Low Temperature Ovens and Dryers – 20 year equipment life
- High Temperature Applications – 25 year equipment life
- Spray Booths – 20 year equipment life

ETS could not find either a 10 year or a 15 year cost effectiveness value in the "Technology Assessment" in the February 2016 Draft Technology Assessment.

Stakeholder Item #9-10: Conclusions: – The Stakeholder stated that the "Technology Assessment is rather comprehensive in nature. However, we find fault in the cost effectiveness numbers due to staffs' using default numbers and potential to emit. We have provided spreadsheets that can be evaluated to determine what constitutes one pound per day of NOx based on BTU input and hours of operation at a number of average BTU inputs from PTE to an average of 20% of PTE."

ETS Response to Stakeholder Item #9-10: ETS would agree that the February 2016 version of the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources (found in Appendix A of this document) was very comprehensive in nature and detailed the methodologies that were utilized; however, the Stakeholder's comments do not correspond with how the cost effectiveness calculations were actually conducted by SCAQMD Staff in the February 2016 Draft Technology Assessment that was the primary focus of the ETS review.

ETS Overall Comments on the Review of Stakeholder Exhibits A - J:

- The Stakeholder used a 10 year equipment life for all of the cost effectiveness calculations presented to ETS. ETS does not believe that the 10 year equipment life utilized by the Stakeholder in performing the cost effective calculations for low temperature ovens/dryers and a spray booth in Exhibits D – I is appropriate for these applications. ETS believes that a 20 year equipment life would be more appropriate for these categories of equipment. Modifying the Stakeholder's cost effectiveness calculations to a 20 year equipment life would reduce the cost effectiveness (in $ per ton) for the equipment evaluated by roughly 50%.

- The rating of the low NOx burners purchased for the retrofit at the facility evaluated by the Stakeholder ranged from 1,000,000 to 2,000,000 Btu/hour. Cost information presented by the Stakeholder for those burners would be applicable to the "Burner Cost and Cost Effectiveness for Low Temperature Ovens and Dryers" section of the Draft Technology Assessment for Rule 1147 Small and Low Emission Sources (pages 3-5 to 3-7). Without revealing any of the facility confidential information provided by the Stakeholder to ETS or the confidential information in the confidential burner costing information provided by SCAQMD to ETS, the following comments could still be made by ETS:

    1. Under the heading of "Equipment Costs" in Exhibits D - I, the Stakeholder included varying costs for the following in each cost effectiveness evaluation: permit to construct fee, source test evaluation fee, and source test. As previously stated, ETS does not believe that these costs are appropriate to include in the cost effectiveness calculations for Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

    2. Note to Stakeholder: The costs listed in columns labeled "Protocol Fees" and "Performance Test Plan Evaluation" in Exhibit C were added together and totaled in the column labeled "Combined Proto and ST Fees"; however all 3 of those columns of costs were then summed to arrive at the total in the column labeled "Individual Device Costs". Therefore, the "Protocol Fee" and "Performance Test Plan Evaluation" cost columns are being double counted in the sum total for the "Individual Device Cost" column for every piece of equipment listed. As previously stated, however, ETS does not believe that those costs are appropriate to include.

    3. With the exclusion of the Stakeholder fees listed in #1 above, ETS reviewed the Stakeholder "Burner Cost" and "Installation" costs columns for new low NOx burners ranging from 1,000,000 to 2,000,000 Btu/hour. With the exception of one piece of equipment, the sum of the "Burner Cost" and "Installation" (which be the total installed equipment cost) for 6 different ovens in Exhibit C were within the range of total installed equipment costs evaluated from the SCAQMD costing information. In fact, the total installed equipment costs for those 6 ovens were below $30,000 (the estimated cost for installing a low NOx burner in small

ovens and dryers found on page 3-6 of the Draft Technology Assessment).

4. After considerable follow-up with the Stakeholder, it is still not understood by ETS why the Stakeholder used average firing rates for the determination of both the starting emissions and the modified source emissions to arrive at the emissions reduction. The following example explains how an "Actual" Stakeholder cost effectiveness calculation for a low temperature oven appears to be grossly overstated with the "DCF Cost Per Ton Reduced" calculated by the Stakeholder as $212,921.

   - The pretest starting emissions of 87 ppm (original burner) and an average BTU input of 300,000 Btu/hour (determined from a gross input of 1,000,000 Btu/hour multiplied by an average BTU input of 30%) were used to calculate the annual starting emissions. Note: Through ETS follow-up questions, the Stakeholder indicated that the average BTU input of 30% was derived from the source test summary sheets listing a maximum input and the average firing rate. However, the Stakeholder indicated that the original burner rating was 600,000 Btu/hour and it was retrofitted with a new Eclipse Winnox burner rated at 1,000,000 Btu/hour. The source test summary sheets provided by the Stakeholder listing the average BTU input of 30% were for the new Eclipse Winnox burner rated at 1,000,000 Btu/hour burner for the "Low Load" source testing. This methodology does not seem logical.

   - The modified source emissions of 30 ppm (new Eclipse Winnox burner) and an average BTU input of 300,000 Btu/hour (determined from a gross input of 1,000,000 Btu/hour multiplied by an average BTU input of 30%) were used to calculate the annual reduced emissions. In presenting an "Actual" case following the Stakeholder's methodology, it would seem to ETS that the actual "Low Load" NOx emissions that were achieved of 6.15 ppm @ 3% O_2 should have been utilized. This would result in higher NOx emissions reduced over the life of the equipment and a significantly lower DCF. Note: The "High Load" source testing provided to ETS indicated NOx emissions of 6.34 ppm @ 3% O_2 with a "Fire Rate" of 410,000 Btu/hour.

   - ETS noted that the original burner had a rating of 600,000 Btu/hour and the new retrofit burner (Eclipse Winnox) had a rating of 1,000,000 Btu/hour. During the ETS manufacturer data review in Section VI.I of this document, ETS noted that the Eclipse Winnox burners were available in 8 sizes with the smallest burner size rated at 550,000 Btu/hour (Eclipse Model Number

WX0050).[12] Additional review of the Eclipse Winnox Model WX0050 Datasheet by ETS indicates a maximum burner input range from 470,000 to 650,000 Btu/hour depending upon the type of blower selected. While ETS can't comment on the specific design reasons for oversizing the new retrofit burner, it does not seem appropriate to include a higher cost for that in the Stakeholders "Actual" cost effectiveness calculations.

5. After ETS obtained the follow-up items requested from the Stakeholder, there were numerous inconsistencies noted between the equipment names, data supplied on the original burner ratings, the new retrofit burner ratings, and the burner ratings that were then utilized in the cost effectiveness calculations for the specific equipment names. In addition, there was insufficient information provided to determine if the process, emissions, usage, operating hours, and other parameters utilized were appropriate.

IX. ETS RESPONSES TO INFORMATION RECEIVED FROM RULE 1147 STAKEHOLDERS AFTER AUGUST 23, 2016 DEADLINE

A summary of the information received from Stakeholders after the August 23, 2016 deadline may be found in Appendix E. The information received by ETS came from the following two Stakeholders: 1) Industrial Process Equipment, Inc. and 2) Furnace Dynamics, Inc. Brief summaries of Stakeholder Item #'s 10-12 and the ETS responses are provided below:

A. Stakeholder Item #10 – Industrial Process Equipment, Inc.

Stakeholder Item #10 (Attachment E-1) contains an undated letter that was received by email from Industrial Process Equipment, Inc. on September 2, 2016. The undated letter was addressed to Wayne Barcikowski at SCAQMD from Jim Waggoner of Industrial Process Equipment, Inc. The Stakeholder concerns were regarding the amount of burners that needed to be changed by July 2012. The Stakeholder also suggested rule amendments for "the added categories that work for the different applications" and for burners that are on the market and have been achieved in practice for a minimum of one year. The final page of the Stakeholder letter recommends "getting with the burner manufacturers to see if the below are correct categories that they can make burners for and to what type of burner will meet the PPM requirements. When can they meet the PPM requirements and then implement them into the rule."

<u>ETS Response to Stakeholder Item #10:</u> The items in this letter do not appear to be applicable to the specific ETS tasks or comments on the February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

[12] *Honeywell Eclipse Product Catalog: Air Heating Burners* (accessed September 20, 2016); available from www.eclipsenet.com/products/winnox/.

B. Stakeholder Item #11 – Industrial Process Equipment, Inc.

Stakeholder Item #11 (Attachment E-2) contains an email from Industrial Process Equipment, Inc. dated September 2, 2016. The email also contained an attachment file of a CAD layout drawing of a conveyorized powder coat system. The CAD drawing, however, was not included as an attachment in this report since it contained client-specific details for a system that is located in Texas.

The CAD drawing is dated as 11/11/15 and is a Conveyorized Powder Coat System for a specific client with the following: "a Spray Power Washer in the front that goes to a Dry Off Oven, then cools down to Two Powder Booths, and then to the Cure Oven, and then to the Unload Area."

ETS Response to Stakeholder Item #11: It is ETS' understanding that the CAD layout drawing was provided by the Stakeholder to convey to ETS the location of the parts washer tank (which is a piece of equipment that falls under Rule 1147) with respect to the layout of the entire system. ETS appreciates the additional Stakeholder information; however, the drawing does not appear to be applicable to the specific ETS tasks or comments on the February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

C. Stakeholder Item #12 – Furnace Dynamics, Inc. (Energy Services Corporation)

Stakeholder Item #12 is an email from Anthony Endres of Furnace Dynamics, Inc. that was received by ETS on September 20, 2016. The email contained an undated document from Anthony Endres of Energy Services Corporation addressed to Wayne Barcikowski at SCAQMD (Attachment E-3). The letter discusses the applicability of the 60 ppm NOx emission limit to different types of metal melting and heat treating furnaces. The commenter proposes each type of furnace should have a different NOx emission limit. The letter also contains a general discussion of BACT for new metal melting and heat treating furnaces that proposes that each type of furnace should have its own BACT limit. Finally, the Stakeholder recommends the use of a pounds per hour basis for determining compliance based on the pounds per hour emitted at 100% for a given burner or classification of equipment. Note: All other Stakeholder items received from Anthony Endres were indicated with the company Furnace Dynamics, Inc.; however, Attachment E-3 was from Energy Services Corporation.

ETS Response to Stakeholder Item #12: The items in this document do not appear to be applicable to the specific ETS tasks or comments on the February 2016 Draft Technology Assessment for Rule 1147 Small and Low Emission Sources.

X. ETS COMMENTS ON RULES CHANGES UNDER CONSIDERATION BY SCAQMD

In conclusion, ETS concurs with the five Rule 1147 changes under consideration as found in Executive Summary Table ES-1 and would like to offer the following additional recommendation for Rule 1147:

> Change the NOx emission limit from 30 ppm to 60 ppm in the afterburner technologies for processes that operate at or below 800°F. This new NOx limit of 60 ppm will be the same compliance limit required for higher temperatures and therefore the same limit at any process temperature in the afterburner technologies category. The burner utilized for these types of applications is not designed to achieve 30 ppm (ETS Recommendation #6).

APPENDIX A

SCAQMD DRAFT TECHNOLOGY ASSESSMENT FOR RULE 1147 SMALL AND LOW EMISSION SOURCES DATED FEBRUARY 2016

BOARD MEETING DATE: March 4, 2016 AGENDA NO. 25

PROPOSAL: Rule 1147 Technology Assessment

SYNOPSIS: At its September 9, 2011 meeting, the SCAQMD Board amended Rule 1147 – NOx Reductions from Miscellaneous Sources. The rule requires staff to conduct a technology assessment and report to the Board on the availability of burner systems and heating units for processes with NOx emissions of one pound per day or less. The draft technology assessment considers potential changes to Rule 1147 for specific categories of equipment based on analysis of technical feasibility and cost effectiveness. Staff has proposed to hire a third party to review the draft Technology Assessment, report findings to Rule 1147 stakeholders and incorporate the reviewer's comments. This action is to receive and file the draft Rule 1147 Technology Assessment.

COMMITTEE: Stationary Source, November 20, 2015; February 19 and January 22, 2016, Reviewed

RECOMMENDED ACTION:
Receive and file.

Barry R. Wallerstein, D. Env.
Executive Officer

PF:JC:GQ:WB

Background

Rule 1147 – NOx Reductions from Miscellaneous Sources, was adopted by the SCAQMD Board on December 5, 2008 with a compliance schedule phased in over 10 years. Rule 1147 incorporates two control measures of the 2007 AQMP: CMB-01 – NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces and MCS-01 – Facility Modernization. Control Measure MCS-01 proposed that existing in-use equipment meet best available control technology (BACT) emission limits in place at the time the AQMP was adopted. Control Measure CMB-01 proposed emission NOx limits in the range of 20 ppm to 60 ppm for ovens, dryers, kilns, furnaces and other combustion equipment. Emission reductions from the equipment addressed by Rule 1147 and Control Measure CMB-01 of the 2007 AQMP were also proposed in prior AQMPs.

Rule 1147 was amended September 9, 2011 to delay implementation dates up to two years, remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. In addition, the rule includes a requirement for a technology assessment on the availability of low NOx burner systems for processes with NOx emissions of one pound per day or less and that are not typically subject to a BACT requirement as new sources. The technology assessment also includes an evaluation of cost and cost effectiveness for small and low emission sources.

Technology Assessment

Initially the SCAQMD technology assessment targeted sources in which burner technology was either not available or the retrofit cost was comparable to the cost of replacing the unit. Several categories of equipment were identified and removed from Rule 1147 and the requirement for a permit through the May 2013 amendments to SCAQMD Rules 219 and 222. Staff continued its technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens to move existing in-use food ovens, roasters and smokehouses from Rule 1147 into their own rule. Rule 1153.1 was adopted on November 7, 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits, later compliance dates and an exemption for small units.

The last phase of the technology assessment focuses on the remaining categories of small and low emission equipment that were not addressed through the Rule 219, 222 and 1153.1 rulemaking efforts. While the focus of this report is on equipment with NOx emissions of 1 pound per day or less, the report also includes information and analysis applicable to larger units. This information is provided in order to address stakeholders' concerns regarding the availability of technology for larger equipment.

This assessment utilizes information on affected equipment from the SCAQMD permit system, New Source Review and Rule 1147 emissions testing programs, and from discussions with equipment and burner manufacturers, affected businesses, consulting engineers and industry representatives. The technology assessment provides information on the types and number of equipment affected by Rule 1147, emissions characteristics of this equipment and estimates of the cost and cost effectiveness of replacing existing older combustion systems. This information provides insight into compliance and affordability challenges faced by businesses affected by Rule 1147.

With the exception of a few categories of equipment, the technology review demonstrates that low NOx burner systems are available for every category of equipment subject to Rule 1147 and have been since the late 1990's. However, staff has identified the following three types of equipment for which burners are not readily available or cannot be retrofitted: 1) low temperature ovens and dryers with heat inputs of less than 325,000 Btu per hour (0.325 mmBtu/hour); 2) existing heated process tanks, evaporators and parts washers; and 3) low temperature burn-off ovens and incinerators.

Cost and Cost Effectiveness
The staff report for the adoption of Rule 1147 in 2008 reviewed costs for a wide range of equipment with heat inputs from less than 1 million Btu per hour to over 20 million Btu per hour. That analysis of cost and cost effectiveness was averaged over a wide range of burner sizes. However, most of the equipment subject to Rule 1147 requirements have heat inputs less than 4 million Btu per hour, and burners used in Rule 1147 equipment are typically smaller than 2 million Btu per hour. The most common burner size in Rule 1147 equipment is about 1 million Btu per hour. Most of the burner sizes analyzed in the 2008 staff report are larger and rarely used in equipment subject to Rule 1147. The burner sizes evaluated in 2008 are more likely to be found in units at RECLAIM facilities.

In the 2008 Rule 1147 staff report, the average cost effectiveness for replacing the smallest burners with the lowest potential NOx emission reductions was estimated to be about $22,400 per ton (adjusted to 2015 dollars). In the current analysis, the cost effectiveness of replacing burners and other components in small and low emission units varies widely. It is highly dependent upon how often a unit is used, which determines potential emission reductions. Staff estimates that a cost effectiveness range of $15,000 to $46,000 per ton is typical for retrofits of small and low emission equipment. However, retrofits of specific types of low emission equipment could result in cost effectiveness as high as $88,000 per ton of NOx reduced.

Staff has used the current SCAQMD BACT Guidelines criteria of $27,000 per ton for equipment that does not have a defined BACT as a guide to evaluate the cost effectiveness of low NOx retrofits for Rule 1147 equipment. Based on this analysis, staff is suggesting a delay of the requirements for equipment with NOx emissions of 1 pound per day or less until the equipment is modified, relocated or replaced with a new unit. This delay would include all spray booths and most small ovens and furnaces. Staff estimates that 4,900 to 5,650 out of 6,400 Rule 1147 units would be affected by this proposal.

Recommendations
As a result of this technology assessment, the following changes are proposed for consideration:

- Exempt sources with total rated heat input less than 325,000 Btu per hour from the Rule 1147 NOx emission limit.
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber for all burn-off ovens, burnout furnaces and incinerators.
- Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until the combustion system or tank is modified, replaced or relocated.
- Delay compliance with the NOx emission limit for existing in-use spray booths until the heating system is modified or replaced or the unit is relocated.
- Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified or replaced or the unit is relocated.

Comments Received
Staff held a meeting of the Rule 1147 Task Force on February 17, 2016 to receive comments on a draft copy of the Technology Assessment that was released for public review. Staff also received comments in a letter from Furnace, Dynamics, Incorporated sent to SCAQMD staff on February 18, 2016. Stakeholders also provided comments at the Stationary Source Committee meeting on February 19, 2016. The attached Draft Technology Assessment does not yet include a discussion of these comments, but staff will incorporate these comments, other stakeholder's comments, contractor suggestions and staff responses into the next draft of the technology assessment, after the contractor meets with stakeholders.

The comments received at the Rule 1147 Task Force Meeting, in the comment letter and at the Stationary Source Committee focused on staff's initial recommendations and potential future rule amendments including: additional criteria for identifying low emission units, providing long term mitigation options, delaying compliance dates, and individual cost effectiveness calculations for every permit application. Another major category of comments dealt with rule implementation by SCAQMD Engineering and Compliance, including permit application review time, changing how potential emissions are estimated under new source review, and postponing Rule 1147 enforcement actions. There were a few comments received by letter and one comment at the committee meeting on the analysis of cost effectiveness in the technology assessment. These comments will be incorporated into the final document and discussed with stakeholders and the contractor prior to presenting the draft final technology assessment to the Stationary Source Committee.

Key stakeholder requests and staff responses are summarized in the table below:

Stakeholder Requests and Staff Response

Stakeholder Requests	Staff Response
• Delay compliance or exempt small and low emission units	• Agree: Exempt small units and delay for low emission units
• Change emission limit for burn-off ovens	• Agree: Raise emission limit for primary chamber
• Exempt existing in-use heated process tanks	• Agree: Delay compliance until modified, replaced or moved
• Delay compliance for existing in-use spray booths	• Agree: Delay compliance for low emission booths until modified, replaced or moved
• Provide more options for demonstrating low emissions other than default PTE	• Rule currently allows options requested, but staff will clarify in rule and provide additional guidance
• Provide different exemption criteria for some equipment, including a 400,000 Btu/hr threshold and a pound per day measurement based on fuel usage	• Staff will work with stakeholders to evaluate alternatives

Future Activity

Staff will continue working with members of the Rule 1147 Task Force and other stakeholders to collect additional information regarding the feasibility and cost of replacing combustion systems in equipment subject to Rule 1147. Staff will release a Request for Proposals to hire a third-party consultant to review the technology assessment and report back to the Rule 1147 Task Force. Staff has invited stakeholders to participate in the contractor selection process, and the contractor will present draft findings at a future Rule 1147 Task Force meeting, receive feedback and answer questions. The results of the contractor analysis and staff response will be reported back to the Stationary Source Committee with a draft final assessment and a list of actions to consider for future rule amendment.

Attachment

Draft Technology Assessment for Rule 1147 Small and Low Emission Sources

ATTACHMENT

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Draft Technology Assessment for Rule 1147 Small and Low Emission Sources

February 2016

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EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

Background

SCAQMD Rule 1147 – NOx Reductions from Miscellaneous Sources was adopted in December 2008 and is an important component of the attainment strategy to meet the federal annual PM2.5 ambient air quality standard as well as meet the ozone standard. The rule regulates NOx emissions from combustions sources that were not addressed by SCAQMD rules other than Rule 474 – Fuel Burning Equipment - Oxides of Nitrogen. Rule 474 was last amended in 1981 and limits NOx emissions rates from equipment burning gaseous fuels to 125 ppm and equipment burning liquid and solid fuels to 225 ppm (at 3% oxygen). Many categories of equipment used in a wide variety of processes are now regulated by Rule 1147. However, similar equipment can have a wide range of operating characteristics, process temperatures and emissions rates. Because of the number and variety of equipment affected, the rule compliance schedule was phased in over 10 years starting in 2010.

Rule 1147 was amended September 2011 to address compliance challenges, remove a requirement for fuel or time meters, delay compliance dates and provide regulatory relief to affected businesses. Throughout the rule amendment process, discussions with affected businesses, equipment manufacturers, and installers focused on concerns that there were many unique pieces of equipment and on the availability of cost effective and affordable low NOx technology. A major concern was the impact of the rule on small and low use equipment with NOx emissions of one pound per day or less. To address this challenge, the amended rule provided two solutions: first, sources with daily emissions rates less than or equal to one pound per day were given a delay of up to two years (until 2017 at the earliest) before they were required to comply with emission limits. These small and low emission units originally had compliance dates five years later than larger units. Second, Rule 1147 included a requirement that staff perform a technology assessment for these small and low emission sources that are not typically subject to the best available control technology (BACT) requirement as new sources.

Technology Assessment

Initially the technology assessment targeted sources where burner technology was either not available or the retrofit cost is comparable to the cost of replacing the unit. Several categories of equipment were identified and removed from Rule 1147 and the requirement for a permit through the May 2013 amendments to SCAQMD Rules 219 and 222. Staff continued its technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens to move existing in-use food ovens, roasters and smokehouses from regulation by Rule 1147 into their own rule. Rule 1153.1 was adopted in November 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits and later compliance dates. In addition, Rule 1153.1 provided a small source exemption for existing in-use units with emissions of up to one pound per day.

The last phase of the technology assessment focuses on the remaining categories of Rule 1147 equipment that were not addressed through the Rule 219, 222 and 1153.1 actions. This assessment utilizes information on affected equipment from the SCAQMD permit system, SCAQMD emissions testing programs and discussions with equipment and burner manufactures, affected businesses, consulting engineers and industry and business representatives. This report provides information on the types and number of equipment affected by Rule 1147, emission characteristics of these equipment and estimates of the cost and cost effectiveness of replacing old burners. Taken together, this information provides insight into compliance and affordability challenges faced by businesses affected by Rule 1147. While the focus of this report is on equipment with NOx emissions of 1 pound per day or less, the report also includes information and analysis applicable to larger units. This information is provided in order to address stakeholder's concerns regarding the availability of technology for larger equipment.

Staff conducted extensive outreach to equipment manufacturers and product installers. Staff went into the field to identify equipment that will comply with Rule 1147 emission limits with available burners and those that may not. Rule development staff has worked closely with industry representatives and other staff to develop solutions to unique compliance challenges. These discussions resulted in a number of proposals to staff that are included in this report.

Ten major categories of equipment were evaluated through the technology assessment including: afterburner technologies, spray booths, crematories, fryers, heated process tanks, metal melting furnaces, heat treating, multi-chamber burn-off ovens and incinerators, ovens and dryers. As a result of this assessment, the following five recommendations are proposed for consideration in future rule development:

- Exempt sources with total rated heat input less than 325,000 Btu per hour from the Rule 1147 NOx emission limit
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of all multi-chamber burn-off ovens, burn-out furnaces and incinerators for all process temperature
- Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until such time the combustion system or tank is modified, replaced or relocated
- Delay compliance with the NOx emission limit for existing in-use spray booths until the heating system is modified or replaced or the unit is relocated
- Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified or replaced or the unit is relocated

Staff estimates that 4,900 to 5,650 out of 6,400 units would be affected by these proposed changes. Staff will continue working with members of the Rule 1147 Task Force and other stakeholders to collect additional information regarding the feasibility and cost of replacing combustion systems in equipment subject to Rule 1147. Staff will release a Request for Proposals (RFP) to hire a third-party consultant to review the technology assessment and report back to the Rule 1147 Working Group. Staff has invited stakeholders to participate in the contractor selection process. The results of the contractor analysis and staff response will be reported back to the Stationary Source Committee with a list of actions to consider for future rule amendment.

BACKGROUND

INTRODUCTION

The California Health and Safety Code requires the AQMD to adopt an Air Quality Management Plan to meet state and federal ambient air quality standards and adopt rules and regulations that carry out the objectives of the AQMP. The California Health and Safety Code also requires the AQMD to implement all feasible measures to reduce air pollution.

SCAQMD Rule 1147 was adopted December 2008 and because of the number and variety of equipment affected, the rule compliance schedule was phased in over 10 years. The NOx reductions from Rule 1147 are a vital component of our attainment strategy and essential for achieving compliance with federal and state ambient air quality standards for PM2.5, PM10 and ozone. Rule 1147 was also amended in September 2011 to address compliance challenges and provide regulatory relief for affected businesses.

REGULATORY HISTORY

Rule 1147 – NOx Reductions from Miscellaneous Sources, was adopted by the AQMD Governing Board on December 5, 2008. Rule 1147 incorporates two control measures of the 2007 Air Quality Management Plan (AQMP): NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MCS-01).

Control measure MCS-01 proposed that equipment operators meet best available control technology (BACT) emission limits at the end of a combustion system's useful life. Control measure CMB-01 proposed emission NOx limits in the range of 20 ppm to 60 ppm (referenced to 3% oxygen) for ovens, dryers, kilns, furnaces and other miscellaneous combustion equipment. Emission reductions from the equipment addressed by Rule 1147 and control measure CMB-01 of the 2007 AQMP were proposed in prior AQMPs (e.g., control measure 97CMB-092 from the 1997 AQMP).

Rule 1147 was amended September 9, 2011 to delay implementation dates one to two years, remove a requirement for fuel or time meters and provide compliance flexibility for small and large sources. In addition, the rule includes a requirement for a technology assessment for small and low emission sources that are not typically subject to the best available control technology (BACT) requirement as new sources.

RULE REQUIREMENTS

Rule 1147 established nitrogen oxide (NOx) emission limits for a wide variety of combustion equipment and affects both new and existing (in-use) combustion equipment. Rule 1147 requires equipment with AQMD permits that are not regulated by other NOx rules to meet an emission limit of 30 to 60 parts per million (ppm) of NOx depending upon equipment type and process temperature. The compliance schedule for existing equipment is phased in over 10 years starting in 2010. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of existing equipment are provided at least 15 years of use before they must meet rule emission limits. The first group of equipment affected had to comply with rule emission limits when they were 20 to 30 years old. Owners of small units and units with emissions of one pound per day or less will comply with emission limits later starting in 2017.

Rule 1147 also establishes test methods and provides alternate compliance options including a process for certification of equipment NOx emissions through an AQMD approved testing program. Certification eliminates the requirement for end-users to test their equipment. Other rule requirements include equipment maintenance and recordkeeping.

In developing rule, staff worked extensively with many stakeholders. Staff held Task Force meetings with representatives from affected businesses, manufacturers, trade organizations and other interested parties. Staff also had separate meetings with manufacturers and distributors of equipment and burner systems. In addition, staff met individually with and visited local businesses to observe operations and equipment affected by Rule 1147. Staff committed to continued discussion with industry through the Rule 1147 Task Force and meetings with individual businesses on issues affecting small business including availability of low NOx burners for unique applications and specific processes.

The majority of the comments made at the Public Workshop and Task Force meetings for the 2011 amendment supported the proposed delay of compliance dates and limits on the use of meters. However, some consultants commented that the compliance delay was not needed and the AQMD should have made a greater effort to educate businesses affected by Rule 1147. An enhanced outreach program to the regulated community was a high priority for the AQMD.

The comments on the proposed amendments received at the workshop and meetings for the 2011 amendment typically fit into two categories. One set of comments dealt with implementation of the rule and asked for clarification or simplification of rule requirements. In response, staff proposed a number of changes relating to equipment identification, maintenance, recordkeeping, and source testing requirements, which ultimately will result in cost savings compared to the original rule. In addition, the amendment added a mitigation fee option that allows business with equipment emissions greater than one pound per day to delay compliance by three years but will provide emission reductions from other sources during that three year period. Together with AQMD efforts to streamline the permit modification process, the amendment helped businesses comply with rule requirements.

The second category of comments received addressed issues beyond the scope of the 2011 amendment which was crafted to respond to the compliance challenges existing at the time. These comments included proposals for new alternative industry-specific rules, questioning availability of low NOx replacement burners, requests for exemption from the rule for small sources, requests to reevaluate rule cost and cost effectiveness and a request to require a cost effectiveness analysis for every piece of equipment subject to the rule. To address many of these issues and as previously stated, the rule amendment committed the SCAQMD to conduct a technology assessment for smaller sources with emissions of one pound per day or less no later than 18 months prior to the first effective compliance date for these smaller sources (July 1, 2017).

AFFECTED INDUSTRIES AND EQUIPMENT

A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, food products preparation, printing, textile processing, product coating; and material processing. A large fraction of the equipment subject to Rule 1147 heats air that is then directed to a process chamber and transfers heat to process materials. Other processes heat materials directly such kilns, process tanks and metallurgical furnaces.

Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the District (NAICS 21, 23, 31-33, 42, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92). The units affected by the rule are used in industrial, commercial and institutional settings for a wide variety of processes. Some examples of the processes regulated by the rule include metal casting and forging, coating and curing operations, asphalt manufacturing, baking and printing.

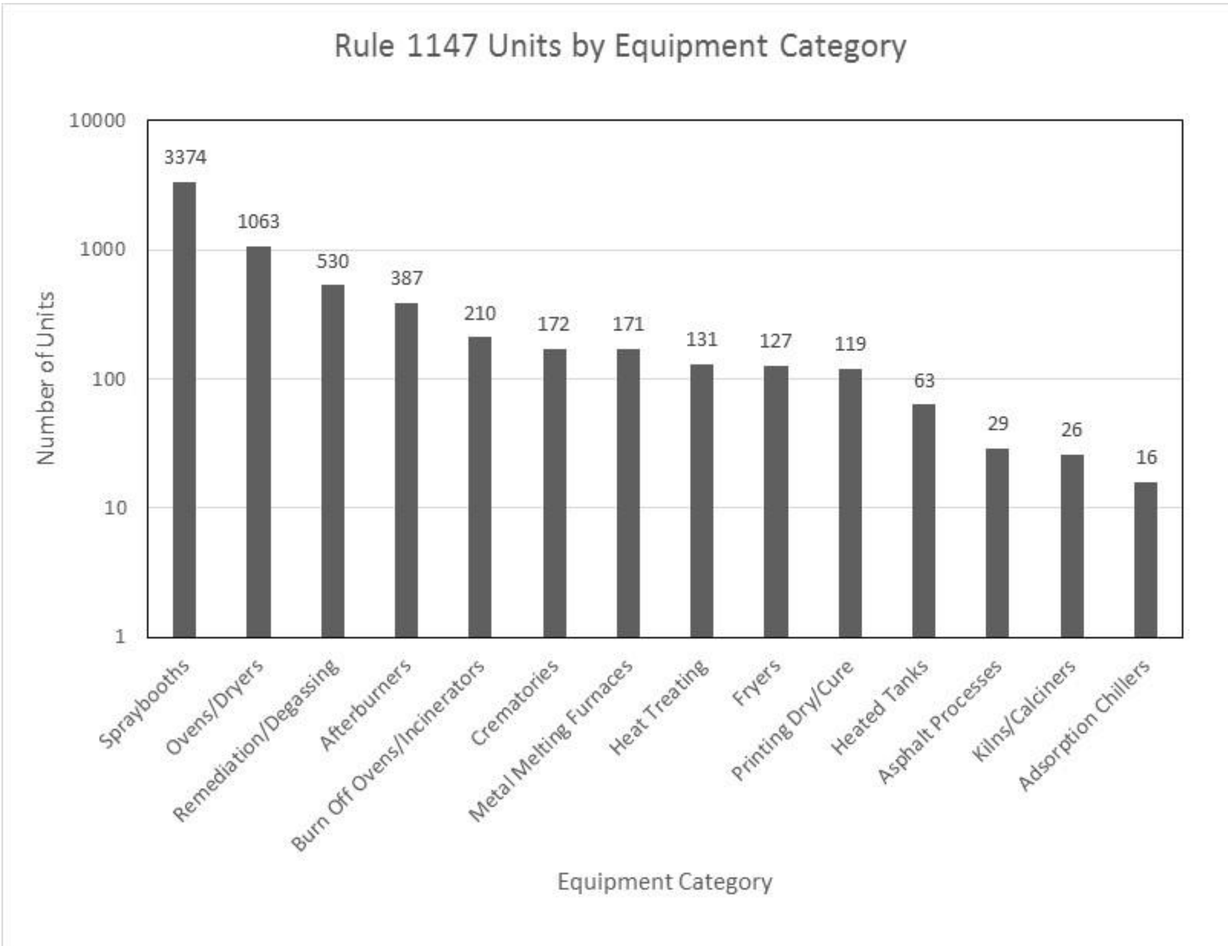
Staff originally estimated approximately 6,600 units subject to the emission limits of Rule 1147 are located at approximately 3,000 facilities. Staff estimated that about 1,600 units at about 800 facilities affected meet the NOx emission limits of Rule1147. This leaves about 2,200 facilities that are expected to require retrofit of burners in their equipment. Staff estimated as many as 2,500 permitted units with NOx emission limits greater than one pound per day and an additional 2,500 permitted units with NOx emission limits of less than one pound per day will require modification to comply with the emission limits.

Based on an update of the active permitted equipment in the SCAQMD, an estimate of the number of equipment potentially subject to Rule 1147 and the fraction of units in different categories is presented in Figure 1-1. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

The second largest category of equipment is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the Figure 1-1.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with high temperature processes (metal melting, heat treating, burn off ovens, kilns and crematories) being the next largest group with approximately 700 units in these five categories. Although these categories have fewer equipment, many units have significantly higher emissions than spray booths and small ovens. Appendix A provides a more detailed summary of the industries and equipment categories affected by Rule 1147.

Figure 1-1



Based on permitted emissions and information provided by manufacturers, vendors and businesses, staff has calculated an emissions inventory of 3.0 to 5.2 tons of NOx per day from the equipment regulated by Rule 1147. Spray booths (≈ 3,400 units) contribute about 0.5 to 0.6 tons per day. Other types of equipment with permit limits of one pound per day or less (≈ 1,500 units) have NOx emissions totaling about 0.4 tons per day. Equipment with a potential to emit of more than one pound per day (≈ 1,500 units) contribute NOx emissions of 2.1 to 4.2 tons per day. These emission estimates are consistent with the 6.2 tons per day emission estimate developed from the 2007 AQMP for adoption of Rule 1147 in 2008.

Note that the AQMP inventory was based on fuel use and default emission factors. The 2007 AQMP inventory did not take into account lower emissions from units that met

BACT emission limits. Using the midpoint of the estimated range from the above calculation for larger sources gives a total inventory estimate for all equipment of about 4.1 tons of NOx per day. This estimate is consistent with the AQMP inventory and permit information that at least one quarter of the units have burners that can comply with BACT and Rule 1147 emission limits.

In addition, staff estimates that as many as half of the units (750 out of 1,500) with a potential to emit greater than one pound per day may have actual daily NOx emissions less than a pound per day. If this estimate is correct, then more than half of units with emissions greater than one pound per day of NOx (about 375) have already submitted test protocols and test results. Moreover, because of the Rule 1147 compliance schedule, most of the remaining half of the 750 units with actual emission greater than one pound per day have been permitted since the late 1990s and installed burners that comply with BACT and Rule 1147 NOx emission limits.

TECHNOLOGY ASSESSMENT

SOURCES OF INFORMATION

This report includes information from the technology assessments for Rule 1147 adoption in 2008, the rule amendment in 2011 and new information from the Rule 1147 emission testing program. This information is summarized by equipment category and by rule emission limit. The basis for the technology based emission limits in the rule are in Part D of the SCAQMD BACT Guidelines. In addition, testing performed to demonstrate compliance with SCAQMD permit limits indicated when an emission limit was achieved in practice and was used in the technology assessments for rule adoption and amendment. While the focus of this report is on equipment with NOx emissions of 1 pound per day or less, the report also includes information and analysis applicable to larger units. This information is provided in order to address stakeholder's concerns regarding the availability of technology for larger equipment.

The appendices to this report provide detailed information on affected industries, emission testing, cost effectiveness calculations, available technology and emission test results for these equipment categories. Appendix A provides a detailed summary of the equipment categories and businesses affected by Rule 1147. Appendix B of this report includes a summary of the sources of information used for rule adoption and the subsequent 2011 amendment. Appendix C provides a discussion of the SCAQMD emission test program, testing guidelines and a summary of the Rule 1147 emissions test completed. Appendices E through N provide details on the equipment, burners and emission test results for the different categories of equipment subject to Rule 1147.

In addition to information available from SCAQMD programs, this report includes recommendations from equipment and burner manufactures, affected businesses, consulting engineers and industry and business representatives. Staff conducted outreach to equipment manufacturers and product installers. Staff went into the field to identify equipment that will comply with Rule 1147 emission limits with available burners and those that may not. Rule development staff has worked with industry representatives and other staff to develop solutions to compliance challenges. These discussions resulted in a number of proposals to staff that are included in this report.

RESULTS OF THE RULE 1147 EMISSION TESTING PROGRAM

Emission testing is performed to demonstrate compliance with an emission limit. Testing companies do enough calibration, testing and calculation to prove that pollutant concentration or mass emissions are below the applicable limit. Most Rule 1147 emission test results are adjusted by the testing company or SCAQMD staff to address issues with a test's acceptable range or with other testing and calculation issues. While emission tests can demonstrate compliance with an emission limit, many test results cannot be used to accurately estimate concentrations or mass emissions from individual units and categories of equipment. However, the Rule 1147 testing program does demonstrate that burners and their control system comply with the rule emission limits.

Table 2-1 provides a summary of submitted Rule 1147 NOx emission test results that have completed SCAQMD staff review and demonstrated compliance with Rule 1147 emission limits. These test results indicate that equipment subject to Rule 1147 comply with the NOx emission limits. Table 2-1 shows the number of test results and average NOx emission concentrations for units tested at the highest and at a low firing rate if applicable. In most cases the highest firing rated tested is the normal operating condition. However, in a small number of cases the low firing rate is the normal condition. The table also indicates the applicable NOx emission limit for each category of equipment. Table 2-1 does not include results from tests that were subsequently repeated because the original test did not comply with the test method, test protocol or SCAQMD guidelines.

Table 2-1

Rule 1147 Emission Test Results

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Afterburner/ Regenerative Thermal Oxidizer	30 or 60 [2]	13	26	4	13
Afterburner/ Thermal or Catalytic Oxidizer	30 or 60 [2]	9	40	1	41
Afterburner/ Remediation Unit	60	2	23	1	24
Spray Booth (Automobile)	30	10	24		
Spray Booth (Other)	30	13	18	2	22
Crematory	60	20	50		
Dryer/Asphalt	40	1	35		
Fryer	60	7	29		
Fuel Cell Heater	30 or 60 [2]	1	11	1	9
Heated Tank	60	7	37	1	34
Metallizing Spray	30 or 60 [2]	1	22		
Metal Heat Treat	60	23	48		
Metal Melting (Large)	60	8	42	1	58
Metal Melting Pot/Crucible	60	5	54		
Multi-chamber Burn Off Oven or Furnace	30/60 or 60/60 [3]	11	42 [4]		
Multi-chamber Incinerator	30/60 or 60/60 [3]	1	54 [4]		
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		272		55	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.
[2] The emission limit depends upon the process temperature.
[3] The emission limit for the primary chamber varies depending upon process temperature.
[4] Average NOx emissions measured after the secondary chamber (afterburner).

BURNER AVAILABILITY AND FEASIBILITY TO RETROFIT UNITS

While the Rule 1147 emissions testing program indicates that the rule limits are achievable for all categories of equipment with current available technology, there is one situation where low NOx burners are not available. There is also one type of process for which staff recommends changing an emission limit based on the type of burners used in that process. In addition, there are several related categories of equipment where it is not feasible to retrofit an existing unit.

Burners for Small Ovens and Dryers

Low NOx burners are not available for very small low temperature ovens or dryers. The smallest burners produced are between 0.4 and 0.5 mmBtu per hour. If an oven requires a burner to consistently operate below about 0.3 mmBtu per hour, low NOx burners are not available to meet the 30 ppm NOx emission limit. There are smaller low NOx burners for high temperature applications that must meet an emission limit of 60 ppm. However, these applications typically require multiple burners and the total heat input exceeds 0.4 mmBtu per hour. Based on these findings, staff is considering exempting units with heat inputs less than 325,000 Btu per hour from the rule emission limit.

Emission Limit for Burn off Ovens and Furnaces

The second category of equipment that may have difficulty meeting an emission limit of 30 ppm in low temperature applications is burn off ovens, furnaces and incinerators. Burn off ovens and furnaces melt and incinerate coatings and other materials on a product that is being recycled. This occurs in a chamber where the process temperature may be above or below 800 °F. For processes below 800 °F the NOx emission limit is 30 ppm. The incinerated materials go to a second chamber or incinerator that operates above 800 °F and has a NOx emission limit of 60 ppm.

However, the preferred type of burner for the primary incineration chamber is the same type of burner used in high temperature applications such as afterburners. These are also the same types of burners used in kilns, direct fired furnaces and crematories. These burners have been designed to comply with emission limits in the 50 to 60 ppm range. After discussions of this issue with equipment and burner manufacturers, staff is considering changing the emission limit for the primary chamber of burn off ovens, furnaces and incinerators to 60 ppm.

Heated Process Tanks, Evaporators and Parts Washers

The Rule 1147 testing program has identified three types of heating systems used in process tanks, evaporators and some parts washers that comply with the NOx emission limit. There is no information yet available for the fourth type of heating system. For all four of these systems, the burners and heat exchangers or tubes are designed as one integrated system. If an individual heated tank or evaporator system using any of systems does not comply with the emission limit, then the whole tank will have to be replaced. Exempting existing in-use units from complying the rule emission limit unless the combustion system is modified would address the issue that it is not feasible to retrofit an existing heated tank with different burners. If a tank is retrofitted with new burners, the owner will likely replace the heating tubes or heat exchanger. If the owner rebuilds a process tank, then a rule compliant system can be installed at that time.

COST AND COST EFFECTIVENESS

REVIEW OF SCAQMD COST EFFECTIVENESS ANALYSIS

There is no single cost or cost effectiveness limit established by the SCAQMD Board for use in rule development, permitting or other programs. Cost effectiveness for CARB and SCAQMD rules and programs differ and depend upon the program, the pollutant, the nature of the process and equipment affected and the types of feasible emission control options. For example, in 1993 a $15,000 per ton criteria for RECLAIM Trading Credits was adopted by the Board for the SCAQMD emission trading program to trigger additional evaluation and potential rule amendment. Adjusted to 2015 dollars using the Marshall & Swift Equipment Cost Index, that criteria would now be approximately $25,000 per ton. However, for amendment of the SOx RECLAIM program in 2010, the SCAQMD Board approved an amendment with cost effectiveness up to $60,000 per ton (adjusted to 2015 dollars).

For Rule 1147 adoption, staff estimated average cost effectiveness for replacement of different sizes of burners. Most of the burners evaluated for adoption of Rule 1147 were too large and not used by equipment subject to the rule. Those burners are only used by large equipment subject to the RECLAIM program. Most of the equipment subject to Rule 1147 requirements have heat inputs less than 4 million Btu per hour and burners used in Rule 1147 equipment are less than 2 million Btu per hour. The most common burner size in Rule 1147 equipment is 1 million Btu per hour. In the 2008 staff report, the average cost effectiveness for replacing the smallest burners with the lowest potential NOx emission reductions was about $22,400 per ton (adjusted to 2015 dollars).

For new source review under SCAQMD Regulation XIII, cost effectiveness can be included in the determination of what is best available control technology (BACT) for emission control for non-major sources. For BACT decisions affecting new sources at major facilities, cost or cost effectiveness is not included in the evaluation. However, BACT determinations for non-major (minor) sources are established by two approaches. One path evaluates technology and cost effectiveness as part of a public process to establish minor source BACT. The public process includes workshops and stakeholder input. The cost effectiveness for those decisions varies depending upon the pollutant, process and equipment involved. Note that there is one important difference in the calculation of cost effectiveness between traditional BACT analysis and rule development. For rule development, a best estimate of equipment's useful life is used in the calculation of cost effectiveness instead of a fixed 10 year assumption that is associated with financing of new equipment.

Historically, the second path used to establish minor source BACT was demonstration by a permitted unit at a non-major facility that an emission limit was "achieved in practice." If an emission limit was achieved in practice at a non-major facility, that emission limit became minor source BACT and was required by SCAQMD for applications for subsequent SCAQMD permits for similar new units regardless of the cost and cost effectiveness.

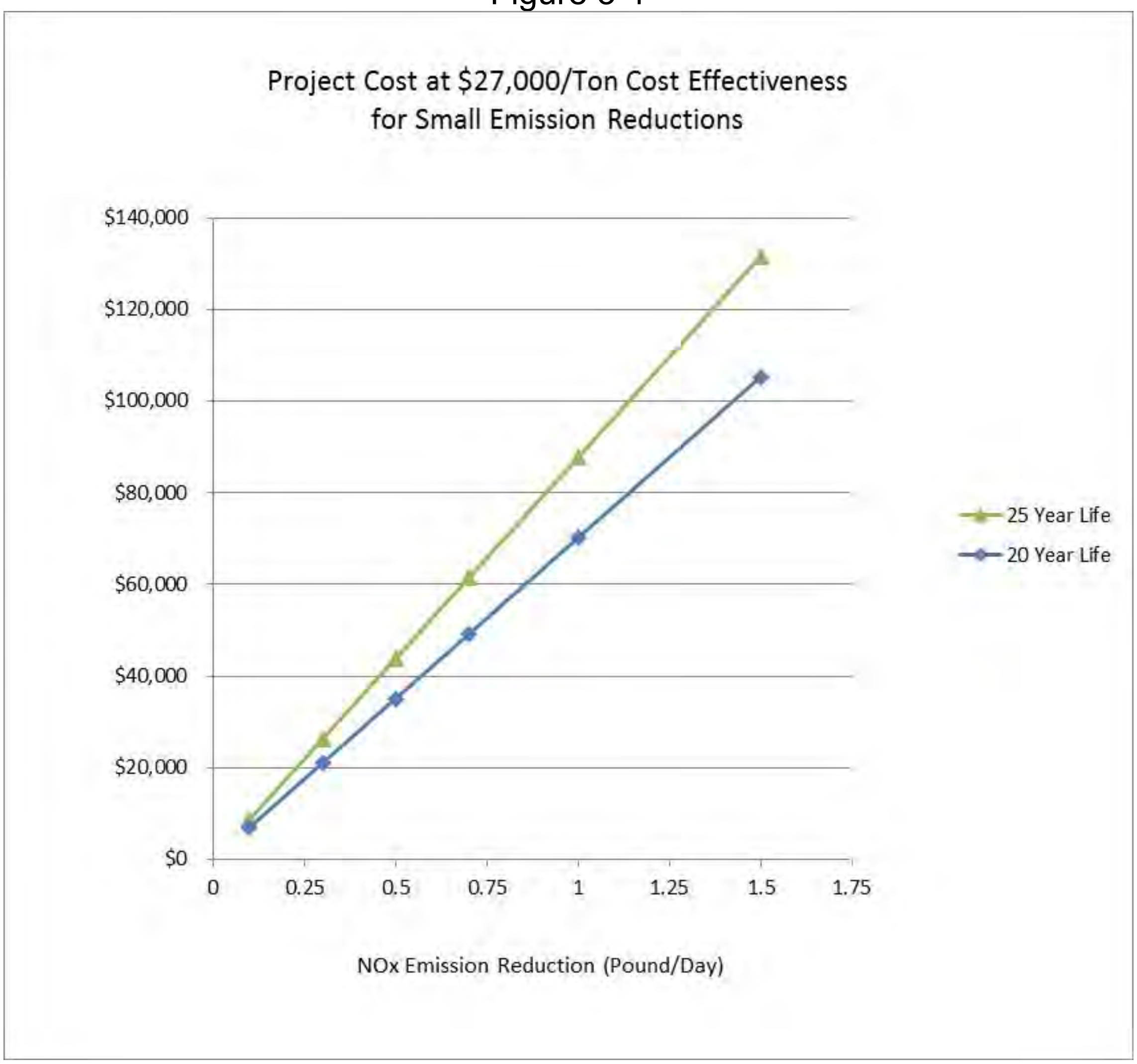
The SCAQMD has also established maximum cost effectiveness criteria in the SCAQMD BACT guidelines for sources for which there is no defined minor source BACT (Appendix

D). These cost effectiveness criteria is adjusted every calendar quarter by the Marshall & Swift Equipment Cost Index to account for changes in equipment cost. The cost effectiveness criteria for processes that do not have an established BACT is currently about \$27,000 per ton of NOx for average cost effectiveness and about \$81,000 per ton of NOx for the incremental cost effectiveness between two or more control options. The incremental cost effectiveness for Rule 1147 equipment is the difference in cost and emissions between an old natural gas burner (BACT prior to 1998) and a low NOx gas burner meeting rule emission limits. These minor source BACT criteria are appropriate for the analysis of cost effectiveness for small equipment with emissions of one pound per day or less.

SCAQMD BACT COST EFFECTIVENESS CRITERIA

The cost to retrofit equipment and the NOx emission reductions for the project can be illustrated for different cost effectiveness criteria with a graph. Figure 3-1 shows an example using small emission reductions of approximately a pound per day and project cost that results in a cost effectiveness of \$27,000/ton of NOx reduced. The cost is shown for projects with equipment lifetimes of 20 and 25 years.

Figure 3-1



For emission reductions of 0.25, 0.5 and 1 pound per day, project costs of \$20,000, \$40,000 and \$80,000 have cost effectiveness of \$27,000 per ton. Emission reductions of 0.25 to 1 pound per day bound the range of emission reductions achievable from small and low emission equipment that are the subject of this technology assessment. This equipment has NOx emissions of one pound per day or less, are exempt from the BACT requirement under new source review and have more time to comply with Rule 1147 emission limits.

DISCOUNTED CASH FLOW ANALYSIS

For calculating cost and cost effectiveness, SCAQMD BACT guidelines (Appendix D) and rule development use a discounted cash flow (DCF) analysis to estimate the cost and cost effectiveness of emission control options. The DCF method is used to calculate a net present value (NPV) of current and future expenses and savings (cash flows) from installing emission control equipment. When determining the cost and cost effectiveness of a control option, the current costs associated with the purchase and installation of equipment are added to the net current value of future costs and savings associated with operating the new equipment. In a situation where one emission control system is replacing another, the future cost and savings incorporated into the analysis are those above and beyond the cost of maintaining and operating the current equipment.

To calculate the cost effectiveness of an emission control system, the purchase, installation and operating cost of new equipment (the NPV) is divided by the emission reduction benefit of the new equipment over the operating life of the equipment. The operating life of equipment can vary from about 10 years for a residential tank type water heater to 25 or more years for residential heating furnaces, boilers, ovens, furnaces, kilns and afterburners. There is a significant number of permitted equipment including ovens, kilns, furnaces and afterburners systems operating in the SCAQMD that are 20 to 50 years old.

LEVELIZED CASH FLOW ANALYSIS

In response to recommendations from a SCAQMD sponsored review of its socioeconomic analysis conducted by Abt Associates and stakeholder comments, all current and future rule analyses will include both the DCF and levelized cast flow (LCF) estimates of costs and cost effectiveness. The cost-effectiveness values based on DCF and LCF methods are not directly comparable to each other: DCF discounts all future operation and maintenance costs to their present values whereas LCF amortizes the initial capital and installation costs over the equipment lifetime. This is why DCF values are always lower than LCF values for the exact same amount of estimated compliance cost.

EXCLUDED COSTS

Because the useful life of boilers, ovens and furnaces can be several decades, the cost of routine maintenance and equipment replacement unrelated to control equipment is not included in the cost effectiveness analysis of regulatory requirements to meet emission standards. For example, a boiler's heat exchange tubes may be replaced several times over the boiler's life. Burners and combustion control systems in boilers and other equipment must be maintained and are routinely repaired or replaced. In addition, heat treating furnaces have refractory and door seals replaced several times over the furnace's lifetime. Indirect fired heat treating furnaces also require replacement of heating tubes and may require replacement of heat shields and recirculation fans as the furnace ages. Furnace refractory, seals, tubes and heat shields may be replaced two to three times over a twenty year period. These routine maintenance and repair expenses are independent of the cost of upgrading equipment to meet emission standards.

Costs for demonstrating compliance with SCAQMD rules and regulations are excluded from cost effectiveness analyses for emission control equipment. SCAQMD BACT Guidelines, permit processing policy, and rule development process do not include the cost of demonstrating rule compliance such as source testing in the calculation of emission control equipment cost effectiveness. However, compliance demonstration costs including emissions testing, recordkeeping and other costs beyond what is recommended by equipment manufacturers are included in the socioeconomic assessment for rule adoptions.

Compliance demonstration costs are not included in a cost effectiveness analysis of new pollution control systems because all units regulated by a rule are subject to the same compliance costs. All units required to meet the Rule 1147 NOx emission limit must be tested and the owner/operator must keep maintenance and test records. A rule compliant unit that does not replace its heating system has the same compliance costs as a unit that does replace burners and other components. Moreover, costs due to compliance with other SCAQMD rules such as Regulation XIII (new source review), including BACT and emission offsets, should not be included in the calculation of cost effectiveness for emission control equipment installed to comply with Rule 1147 emission limits.

CALCULATION OF COST EFFECTIVNESS PER BURNER

The calculation of cost and cost effectiveness for Rule 1147 adoption and the 2011 amendment were done on a per burner basis. There are four reasons for this approach. First, combustion systems retrofit to comply with Rule 1147 emission limits use the same system components whether the unit has one or multiple burners. Burners, valves, and control systems will be the same for each burner. The system component that will differ is the combustion air blower (fan). Some units will use packaged burners with an integrated combustion air blower (fan) and others will use an external blower for one or multiple burners. Second, the cost per burner for a burner with its own integrated combustion air blower is higher than for a system with multiple burners and one blower. Third, most small or low emission units have only one burner and tend to use package burners with integrated combustion air blowers. Fourth, the emissions for the whole unit and per burner will be comparable whether one or multiple combustion air blowers are used. For these reasons, the cost effectiveness analysis in this document focuses on the cost and emission reduction per burner replaced utilizing the cost for a burner with an integrated blower.

COST AND COST EFFECTIVNESS OF REPLACING BURNER SYSTEMS

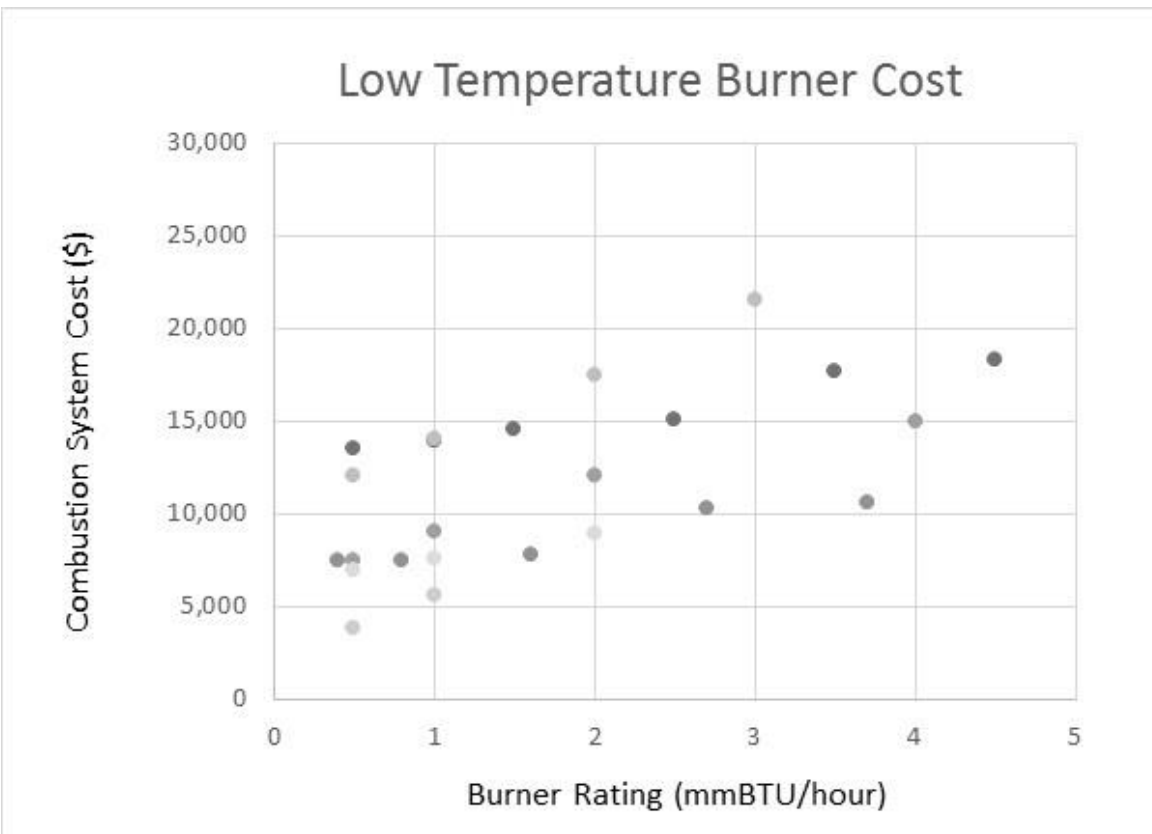
The cost of replacing burners and other combustion system components with the most commonly used low NOx burners is shown in Figures 3-2 and 3-3. Burner and combustion system replacement cost for low temperature applications that are required to comply with a 30 ppm NOx limit are displayed in Figure 3-2. Figure 3-3 shows replacement cost for high temperature applications that are required to meet a 60 ppm NOx limit. These figures include information for the most common burners from the three manufacturers that provide the majority of low NOx burners used in Rule 1147 equipment in the SCAQMD.

Burner Cost and Cost Effectiveness for Low Temperature Ovens and Dryers

Figure 3-2 summarizes information on low NOx burners and system components for low temperature operations including ovens and dryers. These costs represent a typical equipment cost to the customer and do not include tax, shipping and installation costs. The information provided is for nozzle mix burners with packaged combustion air blowers including the Eclipse Winnox and HaloFire, the Maxon Cyclomax and Ovenpak-LE and the MidCo low NOx burner.

Other types of systems can also be installed in ovens and dryers, but the cost of those alternatives are comparable to the cost of burner systems with packaged combustion air blowers. The cost for a burner with a separate combustion air blower is comparable to the cost of a packaged burner. Separate combustion air blowers are used for larger burners or where multiple burners with one blower providing combustion air to all reduces the cost of the system. Low NOx line burners are also available from Eclipse and Maxon but are more commonly used for larger systems than those that are the focus of this report. However, the cost for small line burners are comparable to the cost of the low NOx packaged burner systems shown in Figure 3-2.

Figure 3-2



Eclipse and Maxon each have two nozzle mix low NOx burner product lines for low temperature applications. Each has one system that was developed about 15 years ago (Cyclomax and Winnox) and a recently developed burner system (HaloFire and Ovenpak-LE). Maxon also has a third low NOx burner (the M-Pakt) that uses a different technology to lower NOx that is not included in this Figure but has been installed in a small number of units in the SCAQMD. The M-Pakt burner costs more than the burners included in Figure 3-2 but can achieve significantly lower NOx emissions (less than 10 ppm).

Because some replacements do not require the replacement of the fuel supply components and the control system while other retrofits require the replacement of all components, the Maxon Cyclomax and Eclipse Winnox cost in Figure 3-2 only include the cost of the burner with combustion air blower. The Eclipse HaloFire and the Maxon OvenPak-LE cost include the replacement of fuel and control systems. If a retrofit with a Winnox and Cyclomax burner requires replacement of other components including fuel and control systems, the total equipment replacement cost is comparable to the cost of purchasing a HaloFire or OvenPak-LE with all combustion system components. The MidCo low NOx burners are only sold with MidCo fuel and control system components and have two costs depending upon options requested. Replacement of a units fuel line and control system components depend upon the age of the original equipment and the replacement burner. If fuel line and control system components do not meet current building and safety codes, then they must be replaced with new components that comply with current code requirements.

The majority of the low emission equipment (1 pound/day NOx) subject to Rule 1147 have combustion systems rated less than 2 mmBtu/hour. Most use single burners rated less than 2 mmBtu/hour. The cost for installing a burner in the size range of 0.5 to 2 mmBtu/hour is a good estimate of the cost to replace combustion systems in typical low emission units. The cost of packaged burners and combustion systems of this size varies from about $5,000 to $15,000 with typical equipment costs ranging from $7,500 to $15,000.

However, to calculate total cost of replacing equipment, shipping, tax and installation costs must be added. One approach to estimate installed cost is an established EPA method that uses a multiplying factor to include sales tax and estimate shipping and installation cost. Based on the EPA method and the sales tax rate in southern California, the SCAQMD has used a factor or 1.87 times the cost of equipment to estimate installed cost. In this method, installation costs are assumed to be 50% of the equipment cost and are included in the factor. A contingency can also be included to address uncertainties in the cost estimation. For this analysis an additional 13% is added which results in an installed cost estimating factor of 2.0. Using this factor, an estimated cost for installing a low NOx burner in small ovens and dryers is approximately $30,000 [$15,000 X 2.0] but can be lower or higher depending upon the components replaced and other factors.

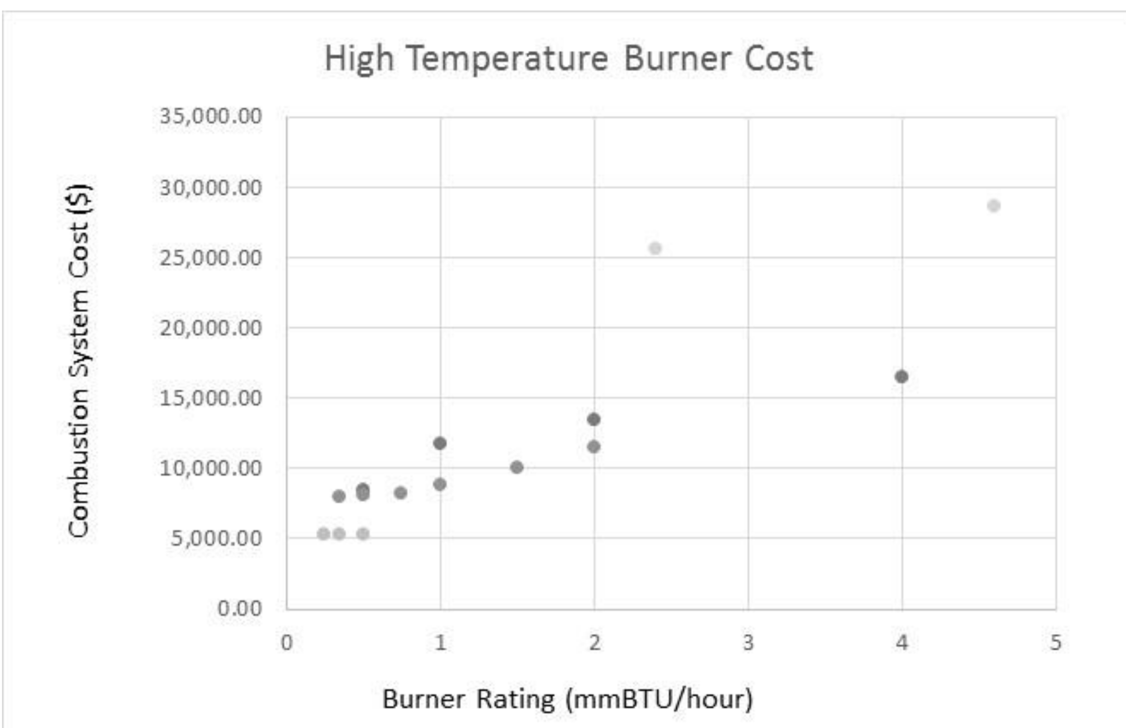
The cost effectiveness of replacing oven and dryer burners in this size range can be estimated using the NOx reductions possible from low emission units. Emission reductions of 0.25, 0.5 and 0.75 pounds per day over 260 days per year and 20 years result in a cost effectiveness of $46,154, $23,077, and $15,385 per ton for a project cost of $30,000. Since most reductions are likely in the range of 0.25 to 0.5 pounds per day, the range is best represented as $23,000 to $46,000 per ton of NOx reduced with the midpoint of this range at $34,500 per ton. This cost effectiveness to replace combustion systems for low emission ovens and dryers is greater than the SCAQMD BACT $27,000 per ton average criteria but less than the $81,000 per ton incremental criteria for minor source BACT.

In summary, the cost of replacement burners and combustion system components can vary depending upon which components must be replaced. Depending upon the age of the original installation, the burner or the entire combustion system may be replaced. In addition, installation cost can vary depending upon the particular piece of equipment and whether the equipment owner has requested additional work that is not required for compliance with Rule 1147 emission limits. Additional cost will be incurred when upgrading capacity and performing other equipment maintenance. Disregarding other costs the equipment owner may choose to include in a retrofit project, the cost effectiveness for low emission units to comply with the Rule 1147 emission limit may exceed the SCAQMD minor source BACT average criteria for NOx.

Burner Cost and Cost Effectiveness for High Temperature Applications

Figure 3-3 displays burner and combustion system costs for high temperature applications. These costs represent a typical equipment cost to the customer and do not include tax, shipping and installation costs. The three most common burners used in high temperature applications to comply with the Rule 1147 NOx emission limit of 60 ppm are the Maxon Kinedizer, the Eclipse Thermjet and Eclipse Tube Firing Burner (TFB). The Kinedizer and Thermjet are used in direct fired heating applications including metal melting, heat treating and in afterburners. The TFB is used for indirect heating applications such as heat treating. Burners from other major manufacturers including Bloom, Facultatieve, and North American/Fives have also been available for more than 15 years and were tested for Rule 1147 compliance. However, these systems were original installed burners and were not retrofits. Staff is not aware of any units that were retrofit with burners from these manufacturers in order to comply with Rule 1147.

Figure 3-3



Pot and crucible furnaces use small nozzle mix burners from a number of manufacturers. Figure 3-3 includes cost for different sizes of the Eclipse Ratio Air burner which has been installed in a small crucible furnace to comply with the Rule 1147 NOx emission limit. A Kinedizer burner has also been used to retrofit a small crucible furnace to increase capacity, reduce fuel cost and lower NOx emissions.

The cost per burner for high temperature applications is similar to the cost for low temperature applications. However, in larger metal melting and heat treating furnaces, multiple small burners are typically used to provide a more even distribution of heat in the furnace. In situations with multiple burners, the furnace is designed with one combustion air blower for all burners. However, the Eclipse Thermjet, the Ratio Air and the Maxon Kinedizer are also used in many applications requiring one burner. Consequently, the cost shown for the Thermjet, Ratio Air and Kinedizer in Figure 3-3 includes the cost of an individual combustion air blower, new fuel supply components and a new control system. In situations where multiple burners are installed with one combustion air blower and a common control panel, the cost per burner will be less. The cost for each TFB burner is based upon the cost for a system with six burners, new combustion air blower, fuel supply components and control system. The cost of the TFB burner also includes a flue gas recirculation (FGR) system for each burner that lowers NOx emissions. The FGR system is currently available for burners rated up to 0.5 mmBtu per hour.

For small high temperature applications up to 2 mmBtu per hour, the cost per burner is similar to the cost for low temperature applications and is in the range of $5,000 to $15,000. Using the EPA based multiplier factor of 2.0 to estimate installation cost for individual NOx burners in small high temperature equipment is approximately $10,000 to $30,000 but can be lower or higher depending upon the components replaced, number of burners and other factors.

Similar to the case of replacing burners in low temperature applications, the cost effectiveness of retrofitting smaller high temperature units with low NOx burners for emission reductions of 0.5 pounds per day or less may exceed the SCAQMD minor source BACT NOx average cost effectiveness criteria. For example, replacing burners at a cost of $10,000 to $30,000 per burner for an emission reduction of 0.5 pound per day per burner over 25 years gives a cost effectiveness range of $6,150 to $18,500. However, emissions are highly dependent on the size of unit and operating schedule. A reduction of 0.25 pounds per day per burner for the same cost gives a cost effectiveness range of $12,300 to $37,000 per ton. With this smaller emission reduction, the cost effectiveness may exceed the minor source BACT average cost effectiveness criteria of $27,000 per ton depending upon the cost of the burners and other components selected. For emission reductions less than 0.2 pound per day the cost effectiveness is likely to exceed the BACT average cost effectiveness criteria.

As with low temperature applications, the cost of replacing burners and combustion system components varies depending upon components replaced. Contingent upon the age of the original equipment, the burner or the entire combustion system may require replacement. Installation cost varies between equipment and locations. In addition, the equipment owner may request additional work that is not required for compliance with Rule 1147 emission limits which will increase the cost of the project.

Heating System Cost and Cost Effectiveness for Spray Booths

The cost difference to a customer between a new certified rule compliant heated spray booth and a new non-compliant unit is less than $10,000 based on information from manufacturers, vendors and the cost of booths prior to rule adoption. The cost for new units includes markups from the booth manufacturer applied to the cost of the burner, gas train and control system. Most of the specialty booths used for applications other than auto body repair were tested with standard burners, so there was no additional equipment cost to comply with Rule 1147 limits. However, the cost for adding a new natural gas fired certified heating system to an existing spray booth varies from $30,000 to $50,000 with a typical cost of about $40,000. The heating system cost varies depending upon the manufacturer, type of booth and the individual installation.

The cost of a complete new booth is highly variable depending upon the type of booth and options. According to vendor supplied information, the cost to purchase and install a new spray booth is about 20% higher than in 2008 when Rule 1147 was adopted. This increase is consistent with industry data on the cost to purchase and install new equipment (i.e., Marshall & Swift Equipment Cost Index which includes inflation, the cost of materials and manufacturing costs). The typical new installation is a semi down draft (side draft) booth for about $80,000. A new basic cross draft booth without recirculation is less and the cost of a new full down draft booth is about $115,000 and up depending upon options. Although the cost for semi down draft and down draft booths are higher than for a basic cross draft, the heating system costs are about the same for basic and premium booths from the same manufacturer or vendor.

The cost effectiveness of a new low NOx SCAQMD certified auto repair booth is at most $22,000 per ton [($10,000 at most) / (70% reduction in NOx) X (0.25 lb/day / 2000 lb/ton) X 260 days/year X 20 years)]. For higher volume shops, the cost effectiveness is lower than $22,000/ton.

The cost to retrofit a used booth to install in the SCAQMD as a new permitted unit is significantly less than purchasing a new booth. However, the cost effectiveness for retrofitting an existing permitted auto repair booth with an SCAQMD certified heating system is $88,000 per ton of NOx reduced based on a cost of $40,000 and a 20 year life. For a high volume booth used two shifts a day, the cost effectiveness could be less than half this value ($44,000/ton). For a booth retrofit costing $30,000 the cost effectiveness is $33,000 to $66,000 per ton depending upon the number of cars processed. This cost effectiveness of retrofitting an existing permitted booth is higher than the minor source average cost-effectiveness criteria of $27,000 per ton and may exceed the incremental cost effectiveness of $81,000 per ton used for equipment without a defined BACT.

Depending upon the age of a used booth, the owner may have to upgrade the booth to meet current building and safety codes. The local building and safety agency may require mechanical, electrical, fire safety and other components be upgraded or replaced. These costs are not attributable to Rule 1147 and are also not included in the cost effectiveness analysis for new, modified or relocated units that require a new SCAQMD permit.

The preceding analysis indicates the cost effectiveness for upgrading existing spray booths to comply with the Rule 1147 emission limit exceeds the minor source average cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment categories without a defined BACT and in some cases may exceed the incremental criteria of $81,000 per ton. However, the cost effectiveness for new units is at most $22,000 per ton and is less than the BACT Guidelines criteria. Because the cost effectiveness to retrofit an existing permitted booth is significantly higher than the minor source BACT criteria, staff is considering amending Rule 1147 to delay compliance for existing in-use permitted booths and heating units until they are modified, relocated or replaced. Staff is proposing that new, modified, or relocated units requiring an SCAQMD permit continue to be required to comply with the Rule 1147 NOx limit at the time of modification or installation. Currently a change of ownership in a business with an existing in-use permitted booth is exempt from the retrofit requirement unless the booth or heating unit is modified, relocated, replaced or becomes 20 years old.

EXAMPLES OF CALCULATIONS FOR SMALL SOURCES

A number of equipment replacement scenarios have been submitted to SCAQMD staff as examples of high cost effectiveness for replacing burners in some small Rule 1147 equipment. This section reevaluates some of those scenarios presented to staff. In order to accurately reflect equipment operation and regulatory requirements, the following analyses use permit application information provided by the applicant, SCAQMD permit conditions and SCAQMD BACT guidelines.

Afterburner Controlling Smoke and Odors from Smokehouse

An after burner for a smokehouse has been in operation since the 1960s. The afterburner is rated at 250,000 Btu/hour, is 50 years old and uses pipe burners. NOx emissions are more than 101 ppm (0.136 pound/million Btu). According to the equipment permit and application, the smokehouse operates 12 hours per day for three days a week and 4 hours per day two days per week. This operating schedule was confirmed by the company owner when recently questioned by an SCAQMD inspector. A permit condition requires the afterburner to operate whenever the smokehouse is in use (40 to 44 hours per week). If the current afterburner operates an average of 40 hours per week every week, NOx emissions over 25 years are 0.88 tons (0.25 mmBtu/hour X [0.136 lb/mmBtu] X [40 hour] X [52 weeks/year] X [25 years] / [2000 lb/ton]). While this operating schedule includes some holidays, it ignores second shifts and weeks when the company operates on a Saturday.

Because of the age and design of this particular afterburner, the entire unit likely needs to be replaced in order to comply with the Rule 1147 NOx emission limit. The burners in the unit are pipe burners which are pipes with holes in them. A consultant working with the company estimated that a replacement rule compliant afterburner would cost about $30,000 (equipment and installation). Staff also contacted vendors to estimate the cost of a replacement afterburner for this application. Based on vendor information, a total project cost of $30,000 is typical for a new afterburner of this size. A new rule compliant afterburner with emissions of less than 60 ppm (0.72 lb/mmBtu) would reduce emissions by at least 0.42 tons over 25 years. The estimated cost effectiveness for this emission reduction is $30,000 divided by 0.42 tons or about $71,000/ton. For this afterburner and other types of equipment with very small burners, the cost of retrofitting or replacing the unit may be higher than the minor source BACT average cost effectiveness criteria for sources without a defined BACT.

The analysis of this case presented to staff showed a much higher cost effectiveness than $71,000/ton because it assumed the afterburner operates only one hour per day. However, this afterburner must be operated at all times the oven is operating and contains smoke. This requirement is common to all emission control equipment permitted in the SCAQMD. In fact, the operator of this particular unit was cited in the past by the SCAQMD for not operating the afterburner consistent with this permit requirement.

Small Heated Process Tank or Evaporator

Many small heated process tanks and evaporators have burners, heat exchangers, and tank dimensions that are specific to each manufacturer and product line. Replacement with different burners may require replacement of the entire tank if the heat exchange system cannot be replaced. The cost for replacing the smallest process tank and heat exchange system is at minimum $30,000 to $40,000. Burners purchased separately for a new tank rated less than one mmBtu/hour may cost as much as $5,000 to $10,000. The minimum cost for a new tank with burners is about $40,000.

Most small heated tanks and evaporators operate with burners that cycle between high fire and off. A typical small system has burners in the size range of 350,000 Btu per hour (0.35 mmBtu/hour) to one million Btu per hour. NOx emissions based on a burner rating of 0.7 mmBtu/hour, a 20 year life and a default emission factor of 0.136 lb/mmBtu for natural gas are about 0.43 pounds per day or 1.1 tons over 20 years [(0.7 mmBtu/hour) X (50%) X (0.136 lb/mmBtu) X (9 hours/day) X (5 days/week) X (52 weeks/year) X (20 years)/(2000 lb/ton)]. This operating schedule does not take into account holidays but it also does not include any weeks with second shifts or operation on Saturdays. A rule compliant system (60 ppm NOx or 0.72 lb/mmBtu) would reduce NOx emission by about 0.52 tons over a 20 year period. The cost effectiveness for replacing the whole system would be about $79,000 per ton ($40,000/ 0.52 tons). The cost to retrofit or replace this type of small low emission unit may be higher than the minor source BACT average cost effectiveness criteria for sources without a defined BACT.

Burners for Generating Smoke and Heating Smokehouse Oven

A smokehouse has been in operations since the 1960s. The burner in the smokehouse is rated 35,000 Btu/hour with NOx emissions of more than 101 ppm (0.136 pound/million Btu of natural gas). Since 1990, BACT for smokehouse smoke generators is an electric heating element instead of a gas fired burner. An electric heating element costs less than $100 including tax and shipping. Electric heating elements come in a variety of shapes and sizes. If the smokehouse burner is similar to round burners used in water heaters or ranges prior to 1983, the owner could also replace the old burner with a low NOx burner (15 ppm) used in modern water heaters for about $100. The cost to install a circuit for the electric heating element or retrofit the gas burner would be about $500 for a total cost of about $600.

The burner/heating element in the smokehouse is used to heat wood chips to slowly generate smoke. It is also used to heat the smokehouse and is assumed to operate an average of two hours per day for 5 days each week. The amount of time the burner fires is determined the amount of wood chips and by the required oven temperature. The oven temperature depends upon the type of sausage produced and whether the smoked products contain sodium nitrite. Products without nitrites must be smoked at a higher temperature to kill bacteria.

For this example, the NOx emissions over 20 years are 50 pounds (0.0250 tons). The cost effectiveness for replacing the burner with a heating element or low NOx burner is at most $24,000/ton of NOx reduced ($600/0.0250 ton). If the burner or heating element operates for more than two hours per day, the cost effectiveness is lower. This example highlights that some small equipment can be retrofit to comply with Rule 1147 emission limits for low cost and reasonable cost effectiveness. Note that on adoption of Rule 1153.1 at the November 2014 Board meeting, existing smokehouses were removed from Rule 1147, included in Rule 1153.1 and are not required to comply with the rule's emission limits.

RECOMENDATIONS

RULE CHANGES UNDER CONSIDERATION

The emission testing program for Rule 1147 indicates that most equipment regulated by the rule can comply with the NOx emission limit (i.e., Table 2-1). The appendices of this report discuss the emissions test results for each category of equipment which demonstrate compliance with rule emission limits. However, low NOx combustion systems are not available for some types of small units. In addition, some categories of equipment are difficult to retrofit. Based on technical feasibility, staff is considering the following changes to Rule 1147:

- Exempt new and existing in-use units with total rated heat input of less than 325,000 Btu/hour from the Rule 1147 NOx emission limit. There are no burners in this size range for ovens and dryers that are designed to meet BACT and Rule 1147 emission limits. The smallest low NOx air heating burners designed to comply with the 30 ppm NOx limit are 400,000 to 500,000 Btu/hour (0.4 to 0.5 mmBtu/hour). If this size burner is set up to operate at less than 325,000 Btu/hour and used in an oven that requires the burner to frequently operate at heat inputs of less than 30% of its capacity, then the burner is not likely to comply with the 30 ppm emission limit. While there are burners in this size range for high temperature equipment including heat treating furnaces and kilns, these units typically use multiple small burners (four or more), have total heat ratings much greater than 325,000 Btu/hour and must comply with a 60 ppm emission limit. This change would affect an unknown number of small units regulated by Rule 1147.
- Delay compliance with the NOx emission limit for in-use heated process tanks, evaporators and parts washers with an integrated heated tank until such time the combustion system or tank is modified. New units would be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour. Source test information on three of the four available types of heating systems for these heated process tanks can comply with the emission limits. However, if a unit does not comply with the emission limit, the entire process tank must be replaced. Staff estimates this change would affect less than 50 units subject to the Rule 1147 NOx emission limit.
- Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators that operate below 800 °F. This new limit will be the same compliance limit required for higher temperatures. The burner needed for the primary chamber of these devices is not designed to achieve 30 ppm. This change would affect a small unknown number of units.

Based on cost effectiveness considerations, staff is considering the following changes to Rule 1147:

- Delay compliance with the NOx emission limit for most existing in-use spray booths until the booth or heating system is modified, relocated or replaced. Modified, relocated and new spray booths and prep stations would be required to meet the emission limit at the time of modification or installation unless the total unit heat rating is less than or equal to 325,000 Btu/hour. However, staff is considering to evaluate existing in-use operations with multiple booths and locations separately from smaller operations with one location and single booths and prep stations. The cost effectiveness for a new unit that meets the Rule 1147 NOx emission limit is at most $22,000 per ton. The cost effectiveness for retrofitting an existing unit can be as high as $88,000 per ton. This change will affect more than half of the units now subject to Rule 1147 emission limits. This will result in delays in emission reductions of 0.3 to 0.4 tons/day starting July 1, 2017. These emission reductions forgone will be reduced as new units replace old units.

- Delay compliance with the NOx emission limit for other existing in-use units with actual NOx emissions of one pound per day or less until the unit or combustion system is modified, relocated or replaced. In addition, if the unit's emissions exceed one pound per day of NOx at a later date, then the unit must comply with the NOx emission limit. Staff is considering to further evaluate operations with multiple small units whose emissions are significant. Unit emissions can be documented using gas or time meters and daily recordkeeping. The cost effectiveness for retrofitting low emission units varies considerably and can be significantly higher than the SCAQMD BACT Guidelines average cost effectiveness criteria for equipment for which BACT has not been defined. This change will affect at least one quarter of the in-use units subject to the Rule 1147 emission limit. This will result in delays of emission reductions of about 0.3 to 0.5 tons/day starting in July 1, 2017. These forgone reductions will decrease as new units replace old units.

These five changes to the rule would address infeasibility of retrofitting specific types of units and reduce cost by delaying compliance with the NOx concentration limit for units with low emissions. These changes would affect at least 4,900 permitted units of which two thirds are spray booths. In addition, up to half of the remaining 1,500 units subject to Rule 1147 may also have NOx emissions less than one pound per day which would result in compliance delays for 5,650 out of 6,400 units. These changes will result in a delay in emission reductions of 0.6 to 0.9 tons per day. However, these forgone emission reductions will be made up over 15 to 25 years as old units are replaced with new compliant units.

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REFERENCES

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SCAQMD, 2011. *Rule 1147 – NOx Reductions from Miscellaneous Sources*, South Coast Air Quality Management District, September 2011.

SCAQMD, 2008. *Rule 1147 – NOx Reductions from Miscellaneous Sources*, South Coast Air Quality Management District, December 2008.

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APPENDICES

Appendix A – Summary of Rule 1147 Equipment Categories

SUMMARY OF RULE 1147 EQUIPMENT CATEGORIES

Units regulated by Rule 1147 are used in commercial, industrial, government and institutional settings and by a variety of businesses. Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the SCAQMD (NAICS 21, 23, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92).

A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, coating; printing, textile processing, material processing, and manufacturing using wood, plastics, ceramic and metal materials. A large fraction of the equipment subject to Rule 1147 heat air that is then directed to an oven or dryer in order to dry or cure materials or coatings (convective heating). In addition, most paint booths and semi-enclosed prep-stations that are used to control overspray of coatings during application also have a heat source to accelerate curing and drying of coatings. Other types of equipment heat products directly using a combination of radiant and convective heating (e.g., radiant ovens, kilns, process tanks and furnaces). Some ovens, dryers, furnaces and kilns do not use burners to provide heat and consequently are not regulated by Rule 1147. They use electric heaters, electric infrared lamps, or heat provided by a boiler or thermal fluid heater. Boilers and thermal fluid heaters are regulated by SCAQMD Rules 1146, 1146.1 and 1146.2.

In 2008 SCAQMD staff originally estimated about 6,600 pieces of equipment located at approximately 3,000 facilities would be subject to the emission limits of Rule 1147. Staff also estimated that at least 1,600 units at about 800 facilities already met the NOx emission limits of Rule1147. The remaining 2,200 facilities were expected to require retrofit of at least one unit. Staff estimated up to 2,500 permitted units with NOx emission limits greater than one pound per day and an additional 2,500 permitted units with NOx emission limits of less than one pound per day might require modifications in order to comply with the emission limits.

Based on an update of the active permitted equipment in the SCAQMD, an estimate of the number of equipment potentially subject to Rule 1147 and the fraction of units in different categories is presented in Figures A-1, A-2 and A-3 below. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

The second largest category is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the Figures A-1, A-2 and A-3.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with metallurgical processes (metal melting and heat treating) being the next largest group with approximately 300 units between the two categories. Although these categories have fewer equipment, many include equipment with significantly higher emissions.

Figure A-1

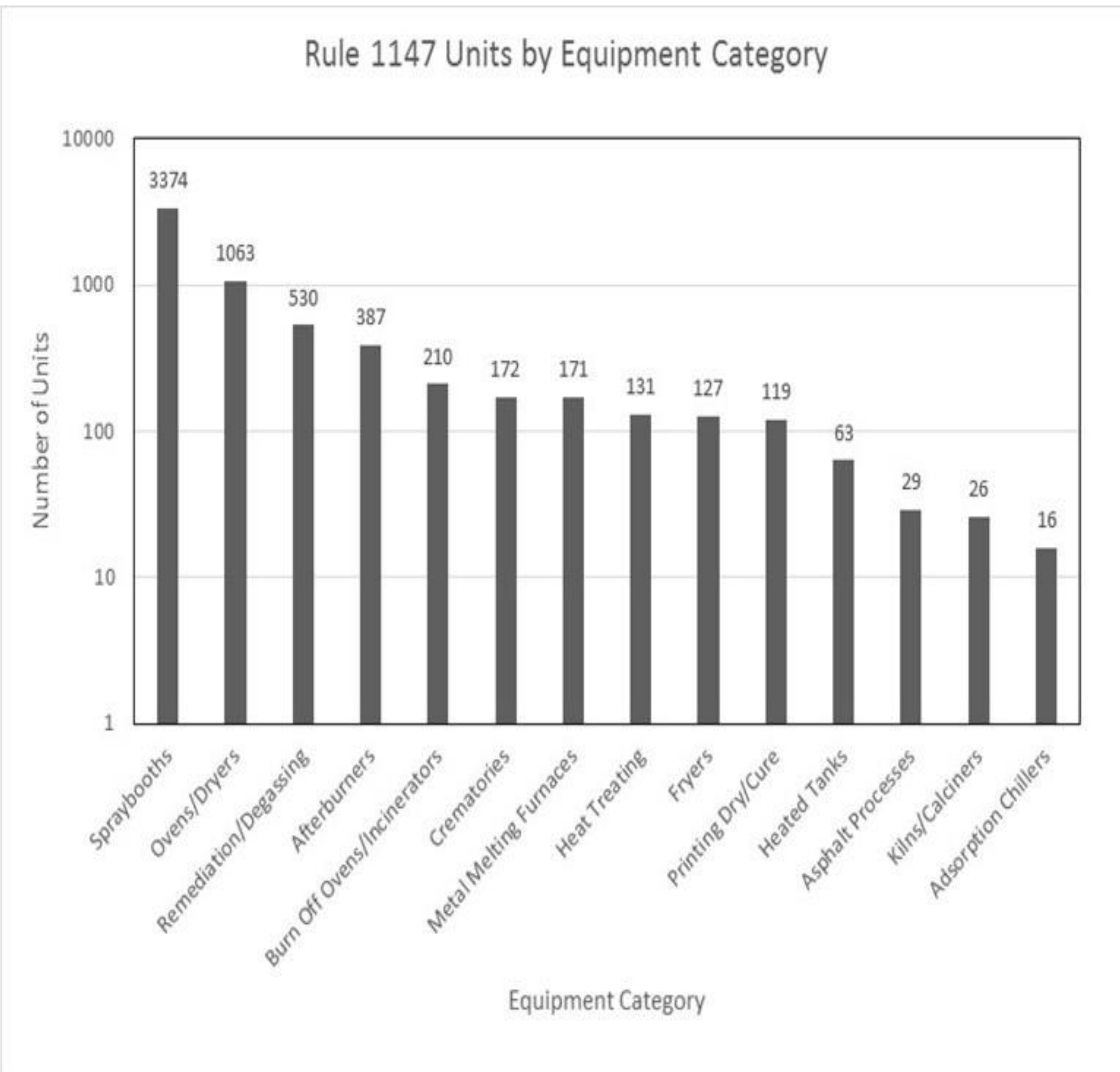


Figure A-2

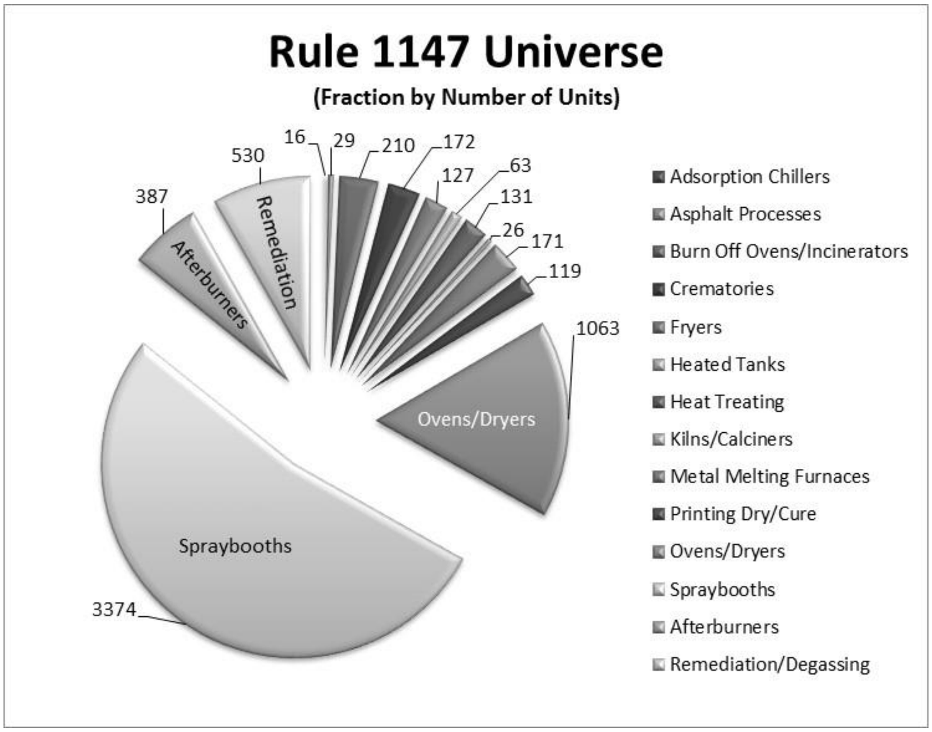
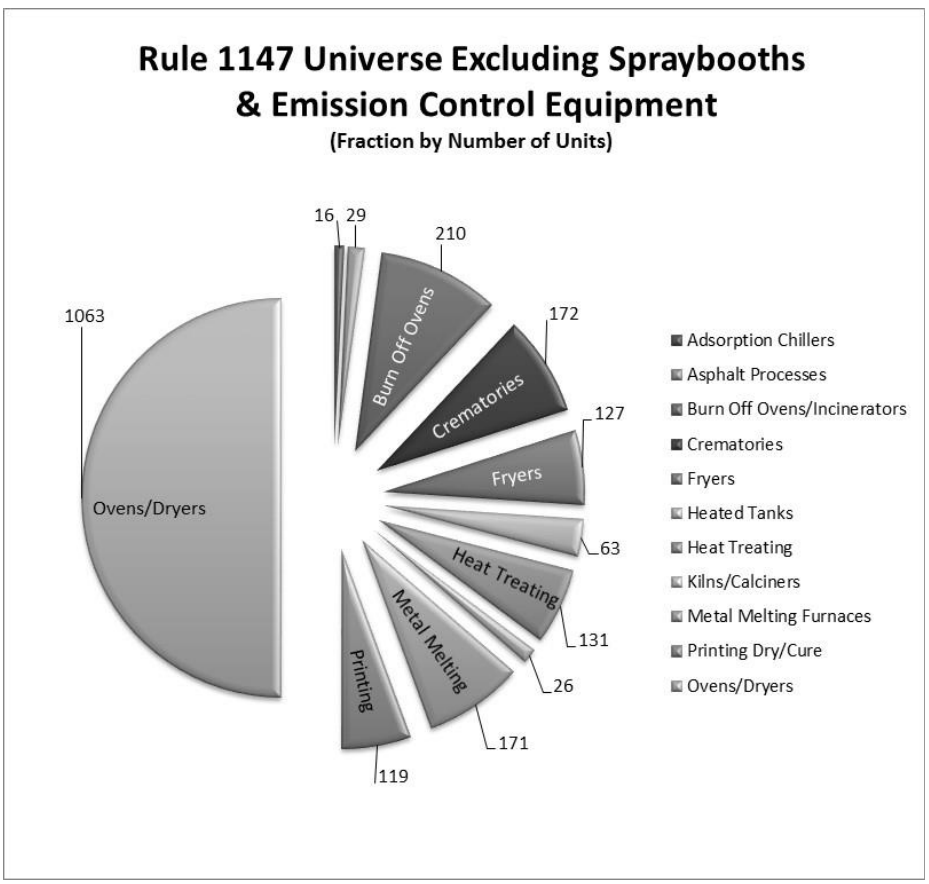


Figure A-3



The focus of this technology assessment is on smaller low emission equipment with emissions of one pound per day or less. An emission level of one pound per day is used to determine a unit's Rule 1147 compliance schedule. Units with emissions of one pound per day or less are provided up to 20 years from date of manufacture before they are required to demonstrate compliance with the NOx emission limit. Units with emissions greater than one pound per day must demonstrate compliance by the time a unit is 15 years old. New or relocated units must demonstrate compliance when they are installed. A potential to emit (PTE) of greater than one pound per day for new or relocated units also triggers the requirement to install best available control technology (BACT) under new source review (NSR) pursuant to SCAQMD Regulation XIII.

Staff has estimated the number of Rule 1147 units with NOx emissions greater than one pound per day based on a unit's PTE in the SCAQMD permit database. For spray booths and prep stations (semi-enclosed spray booths), approximately 5% (about 170) have NOx emissions greater than one pound per day. These higher emitting booths are either larger than the booths used for refinishing automobiles and light trucks or they are used in a production line at a manufacturing facility. For the remaining categories of equipment, approximately 50% have a PTE greater than one pound per day. This means approximately 1,700 units subject to Rule 1147 potentially have NOx emissions greater than one pound per day. The remaining 4,700 units have a PTE of one pound per day or less.

In previous analyses presented in rule staff reports and to the Rule 1147 Task Force, staff estimated that with the exception of spray booths at least 25% of the units in each category will comply with Rule 1147 limits without retrofitting burners. However, recent results from emissions testing of Rule 1147 units suggest that the compliance rate for units with their original burners and NOx emissions greater than one pound per day could be 50% or greater for some categories of equipment. In addition, some units with a PTE less than one pound per day have low emissions because the owner originally installed BACT compliant burners and reduced their PTE below one pound per day. New or modified sources are not required to purchase emission offsets if the average emission increase is a pound per day or less.

As an alternative to estimating emissions based on the inventory developed for the SCAQMD AQMP, total NOx emissions from equipment subject to Rule 1147 can be estimated using these units' PTE and other information. Business owners and equipment vendors indicate typical automotive booths and many other booth operations have annual average emissions of less than one third pound per day. However, up to 200 booths used in manufacturing and other applications may have emissions of a pound per day or more. Based on this information, the 3,400 permitted booths and spray stations have emissions of 0.5 to 0.6 tons NOx per day. The 1,500 other types of combustion equipment with PTE of less than or equal to a pound per day have average emissions of 0.5 pound per day per unit for a total of about 0.4 tons NOx per day. Based on this approach, the 4,700 Rule 1147 units with a PTE equal to or less than one pound per day emit about one ton of NOx per day.

The average PTE for the remaining 1,500 units is 5.6 pounds NOx per day using each units 30 day average PTE. The 30 day average PTE is calculated for a month using the weekly operating schedule but the monthly emissions are divided by 30 days instead of the number of days the equipment operates each month. Assuming these 1500 units emit at least half of their 30 day average PTE, the range for the emission estimate from the 1,500 greater than one pound per day units is from 2.1 to 4.2 tons of NOx per day. Using the range for the emission estimates calculated above provides an estimated total Rule inventory of 3.0 to 5.2 tons of NOx per day from the equipment regulated by Rule 1147. This emissions estimate is consistent with the 6.2 tons per day emission estimate developed from the 2007 AQMP for adoption of Rule 1147 in 2008.

It should be noted that the AQMP inventory was based on fuel use and default emission factors. The 2007 AQMP inventory did not take into account lower emissions from units with burners that can achieve BACT emission limits. Using the midpoint of the estimated range for larger sources gives a total inventory estimate of 4.1 tons of NOx per day for Rule 1147 equipment. This emission estimate is consistent with the AQMP inventory and permit information that at least one quarter of the units have burners that can comply with BACT and Rule 1147 emission limits.

In addition, staff estimates that as many as half of the units (750 out of 1,500) with a potential to emit greater than one pound per day may have actual daily NOx emissions less than a pound per day. If this estimate is correct, then half of the units with actual NOx emissions greater than one pound per day of NOx have already been tested (about 375) and comply with Rule 1147 emission limits. Moreover, because of the Rule 1147 compliance schedule, most of the remaining half of the 750 units are likely to have been permitted since 2000 and would have installed burners that will comply with BACT and Rule 1147 emission limits.

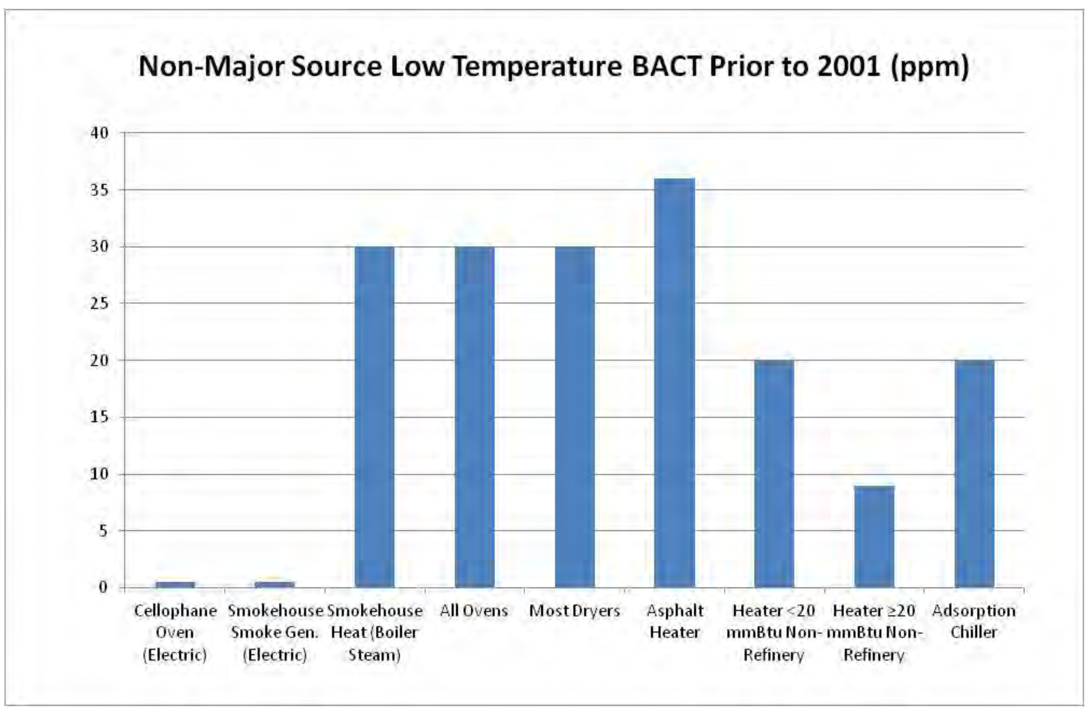
Appendix B – SCAQMD BACT and Test Results for Emission Limits Achieved in Practice and Used for Rule Development

SCAQMD BACT AND TEST RESULTS FOR EMISSION LIMITS ACHIEVED IN PRACTICE AND USED FOR RULE DEVELOPMENT

Rule 1147 was adopted on December 5, 2008 and amended September 9, 2011. Rule 1147 is based on two control measures from the 2007 Air Quality Management Plan (AQMP): NOx reductions from Non-RECLAIM Ovens, Dryers and Furnaces (CMB-01) and Facility Modernization (MSC-01). NOx emission from ovens, furnaces, kilns and afterburners had been proposed as control measure CMB-02 in the 1994 and 1997 AQMPs. Facility Modernization was a new AQMP measure that proposed equipment be upgraded to the best available control technology (BACT) available at the time the 2007 AQMP was adopted. The Facility Modernization measure is also proposed to be continued in the upcoming revision to the AQMP.

This appendix provides a summary of the NOx BACT determinations and SCAQMD permit limits achieved in practice by different types of units prior to rule adoption in 2008 and the 2011 rule amendment. The following figures were presented in rule development Task Force meetings and Rule 1147 Staff Reports for the 2008 adoption and the 2011 amendment. Figures B-1 to B-4 identify BACT determinations that were published by the SCAQMD and other air agencies prior to rule adoption. Figures B-5 and B-6 identify NOx emission limits that were achieved in practice through test results for equipment permitted prior to rule adoption. Figures B-7 and B-8 identify additional emission test results indicating NOx emission limits that were achieved in practice by permitted equipment tested in the SCAQMD prior to the 2011 rule amendment.

Figure B-1



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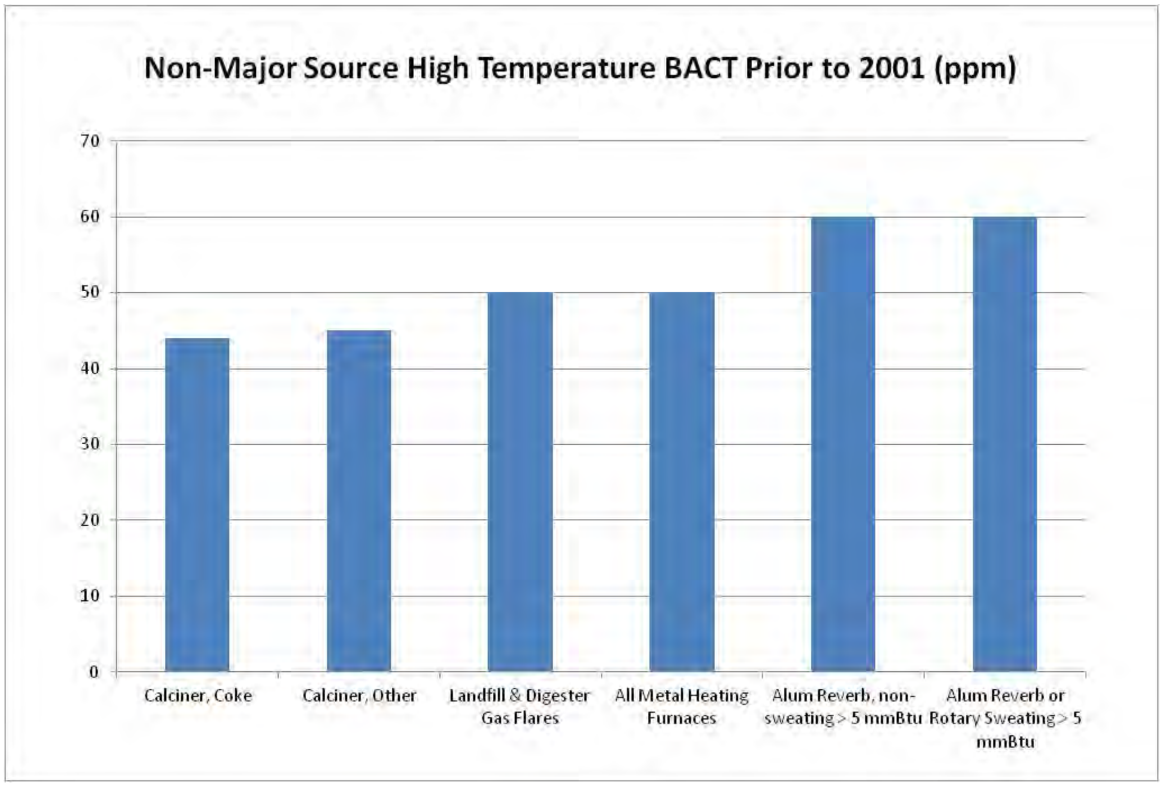

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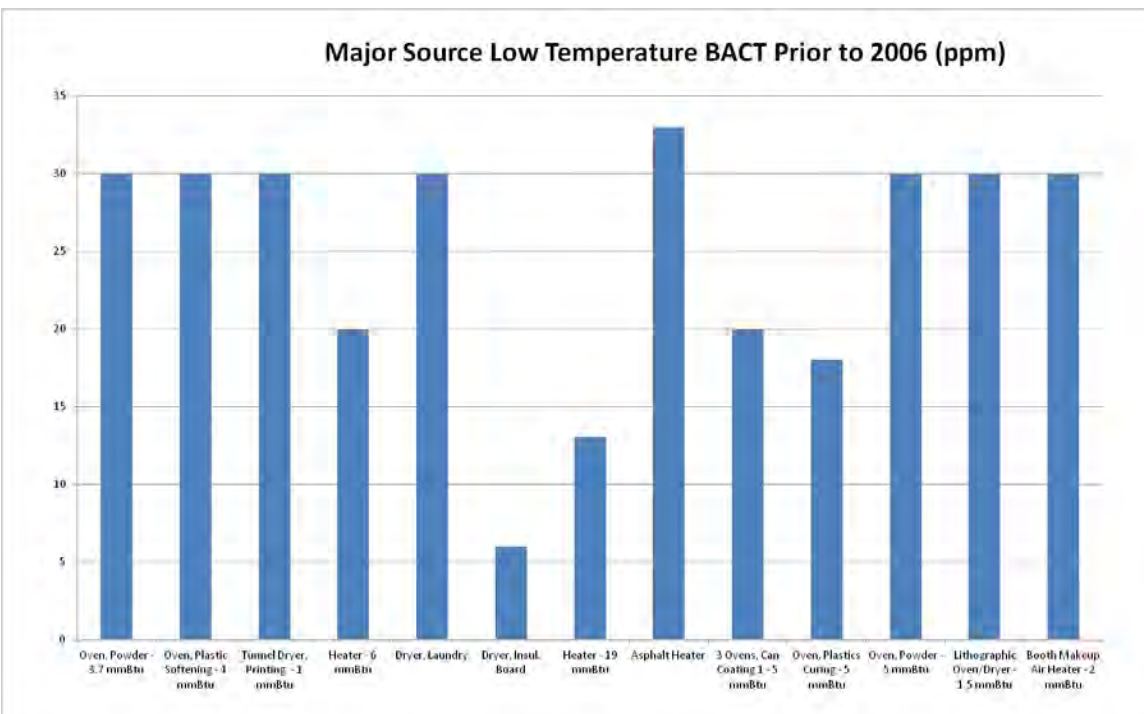

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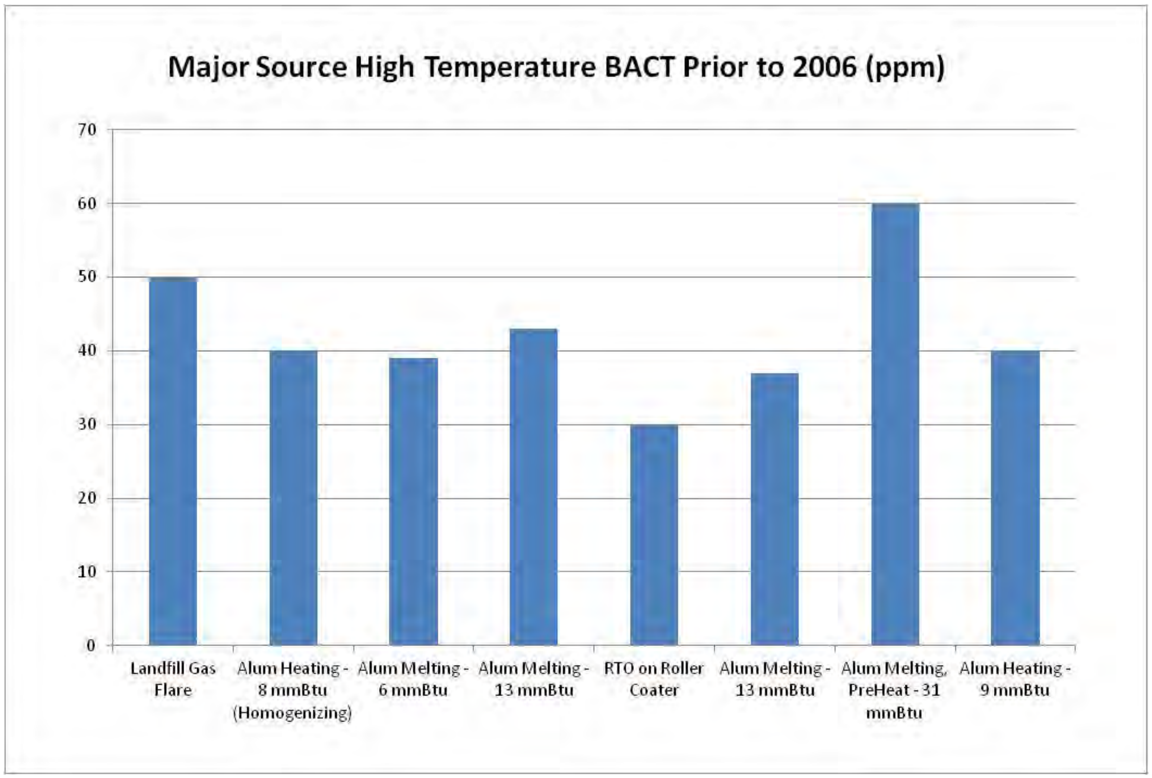

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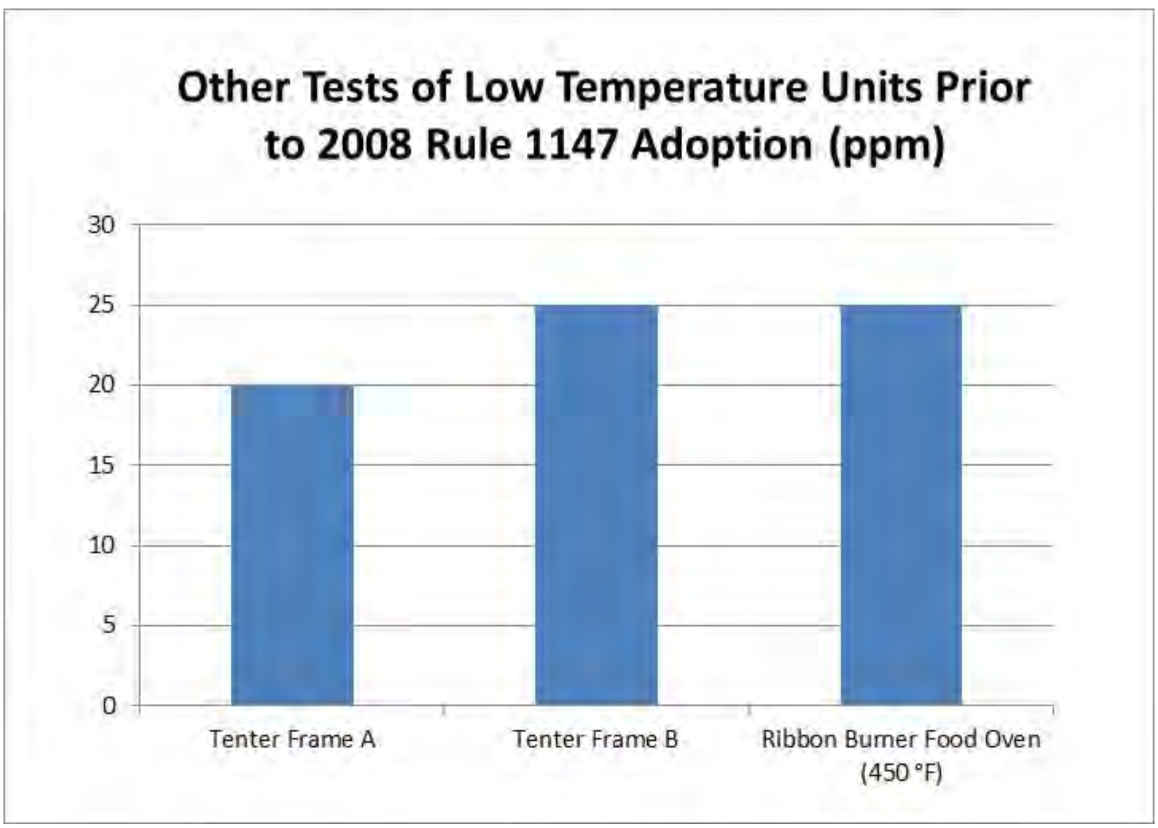


Figure B-6

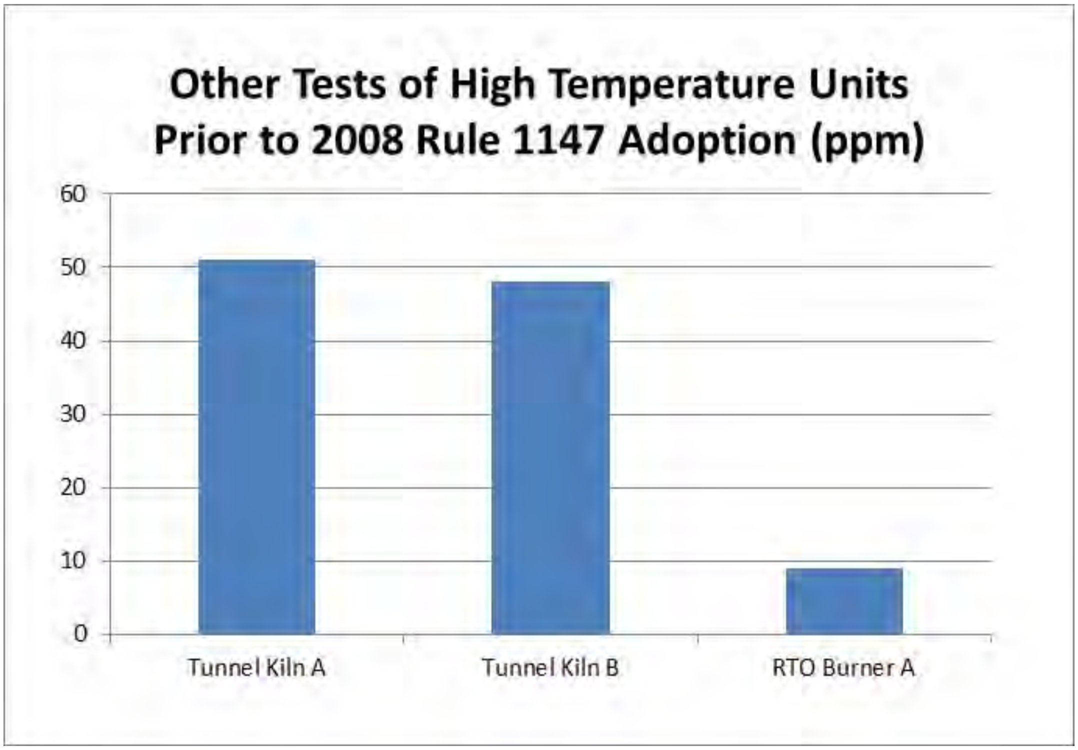


Figure B-7

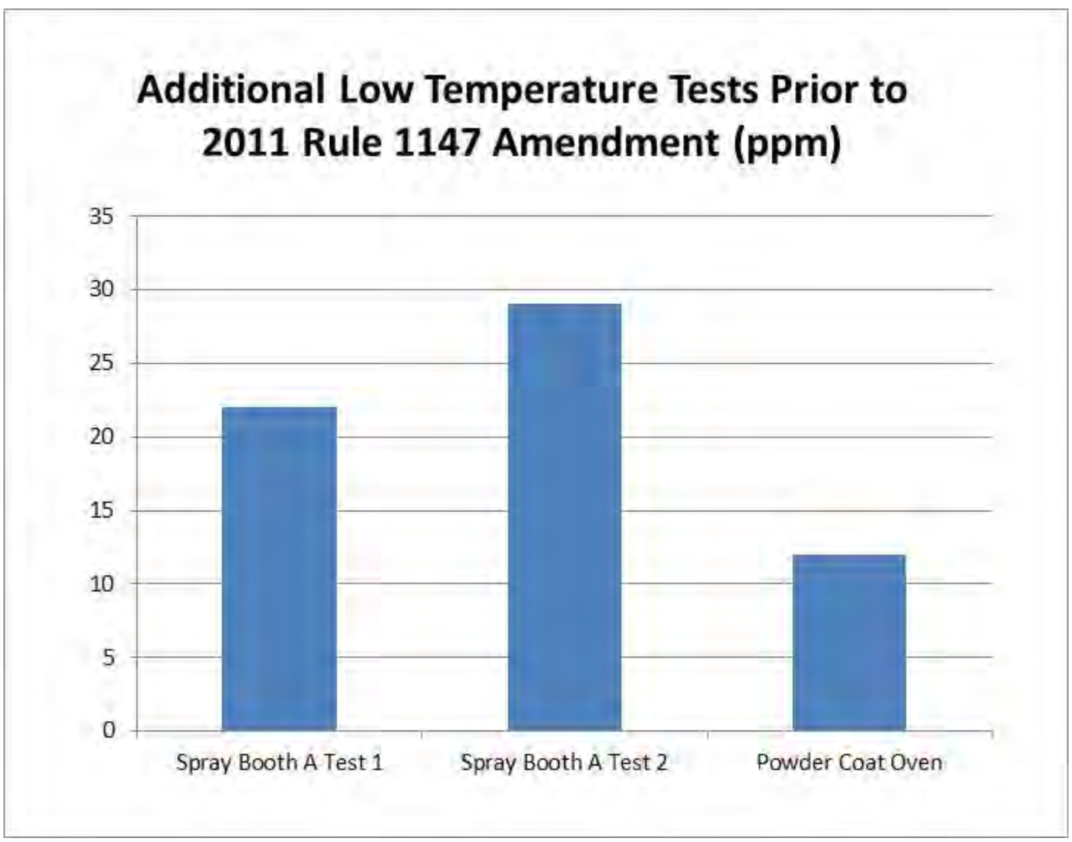
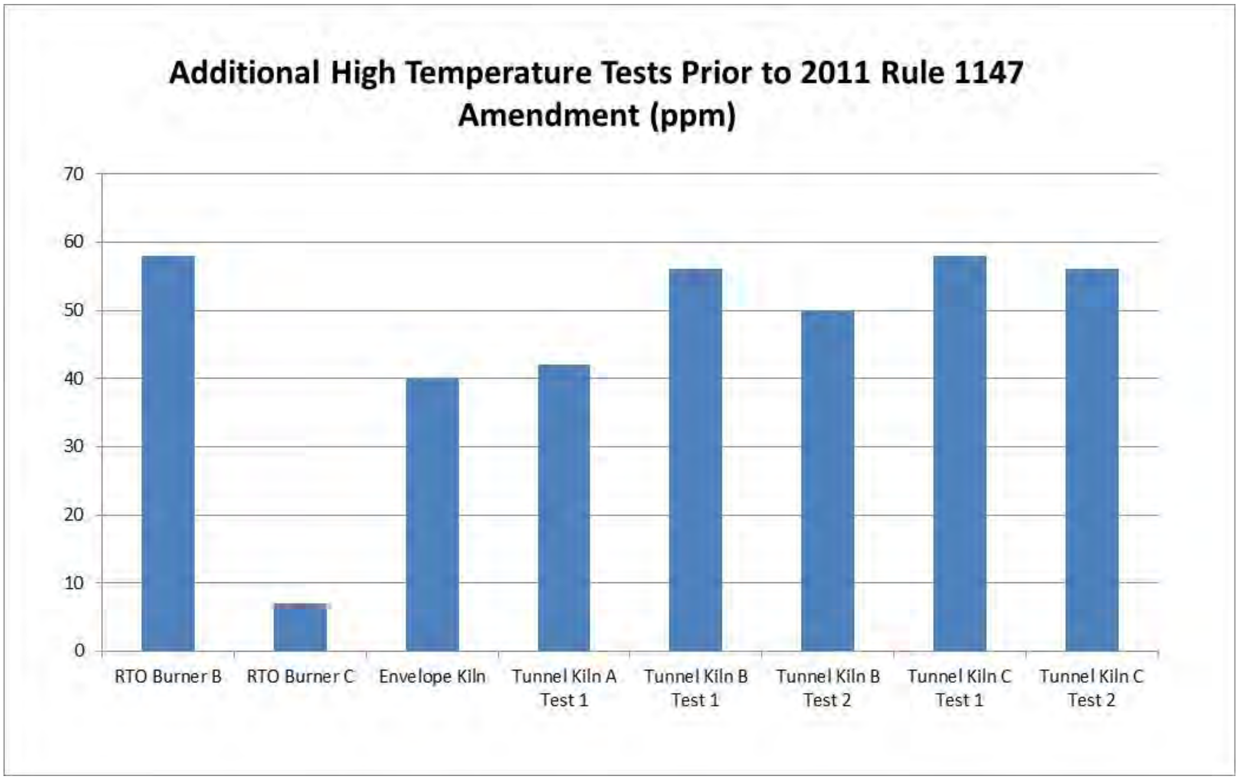


Figure B-8


Additional High Temperature Tests Prior to 2011 Rule 1147 Amendment (ppm)
70
60
50
40
30
20
10
0
RTO Burner B
RTO Burner C
Envelope Kiln
Tunnel Kiln A Test 1
Tunnel Kiln B Test 1
Tunnel Kiln B Test 2
Tunnel Kiln C Test 1
Tunnel Kiln C Test 2

Appendix C –Rule 1147 Emission Testing and Test Limitations

RULE 1147 EMISSION TESTING AND TEST LIMITATIONS

Demonstrating compliance with emission or other limits is required for Rule 1147 and all federal, state and SCAQMD air pollution regulations. In order for a new or amended SCAQMD rule to be approved for inclusion in the State Implementation Plan (SIP), test methods must be identified in the rule and approved by CARB and EPA. Rule 1147 identifies test methods that may be used to determine NOx, CO, O_2 and CO_2 concentrations and mass emissions.

In addition to EPA approved test methods, the SCAQMD also provides guidelines and generic test protocols to assist equipment owners and testing companies to prepare for and perform approvable emission tests. Because of the large variety of equipment regulated by Rule 1147, the equipment owner and the testing company must submit a test protocol and receive SCAQMD approval before testing a unit.

Emission testing can be more difficult for open direct fired units and dryers that heat large quantities of air because pollutant concentrations are diluted. Examples of these types of equipment include conveyor type ovens, textile dryers and drying ovens. Testing these units may require using a calibrated fuel meter in order to demonstrate compliance with the rule's fuel-based mass emission limit (pounds per million BTU of fuel) and additional sampling and analysis to determine carbon dioxide (CO_2) concentrations in the exhaust. CO_2 concentrations are used as an alternative to O_2 concentrations in order to adjust NOx concentrations to the Rule 1147 reference level of 3% O_2 when exhaust oxygen (O_2) concentrations are high (close to ambient levels),

The test results used for this report have been reviewed by SCAQMD Engineering, Compliance and Source Testing staff. When Rule 1147 emission testing protocols and test reports are reviewed by SCAQMD staff, they are rated as acceptable, conditionally acceptable, or unacceptable. Test reports are classified unacceptable when the report does not include all required documentation, the test was not performed consistent with the test method and approved protocol, or the test results cannot be used to demonstrate compliance with the applicable emission limit.

Tests reports are classified conditionally acceptable when the test results indicate compliance with the applicable emission limit but results are adjusted by SCAQMD staff, emissions cannot be estimated accurately but mass emissions or concentrations are equal to or less than the applicable emission limit or carbon monoxide (CO) emissions cannot be accurately determined. Rule 1147 does not include a CO emission limit because the SCAQMD is in compliance with federal and California ambient air quality standards. However, CO concentrations are routinely measured to ensure compliance with permit or facility requirements if applicable.

The most common reason for an emission test report to be rated conditionally acceptable is the reported emissions of NOx or CO have been adjusted by staff so results are consistent with SCAQMD testing and reporting guidelines. Mass emissions or concentrations may be adjusted higher or lower but the adjusted results demonstrate compliance with the rule limit.

For many test results, emissions are expressed as less than a specific concentration or mass emission rate that demonstrates compliance with the applicable emission limit. In order to be considered accurate, SCAQMD guidelines require that test results fall between 20% and 95% of the concentration of the highest concentration (high span) calibration gas used for that pollutant for that test. When results are not within the test's acceptable range, they are adjusted up to 20% of the acceptable range if they are lower, additional calibration gasses are tested to expand the range or define a lower sub-range, or the test is repeated using a different set of calibration gasses.

Adjustment up to the low end of the acceptable range (20% of the high span calibration gas) is a common result for equipment with dilute pollutant concentrations and high O_2 concentration in the unit's exhaust. Although these test results can be used to demonstrate that pollutant levels are less than a specific concentration (i.e., the low end of the acceptable range), they cannot be used to accurately estimate concentration or mass emissions. When the estimated concentrations are lower than the acceptable range of the individual test but an adjustment up to 20% of the acceptable range is still less than or equal to the applicable emission limit, the test result is satisfactory for the needs of the client and no further calibration or testing is performed by the testing company.

Test results for CO are often adjusted up to 20% of the acceptable range and because most permits do not limit CO emissions, no further analysis for CO is performed. However, when CO concentrations are adjusted up to 20% of the acceptable range, the adjusted estimated CO concentration can be up to three orders of magnitude higher than the actual concentration.

In summary, testing is performed to demonstrate compliance with an emission limit and businesses and testing companies do enough calibration, testing and calculation to prove that pollutant concentration or mass emissions are below the applicable limit. Most Rule 1147 emission test results are adjusted by the testing company or SCAQMD staff to address issues with a test's acceptable range or with other testing and calculation issues. As a result, most test results can demonstrate compliance but cannot be used to accurately estimate concentrations or mass emissions from individual units and categories of equipment.

Table C-1 provides a summary of submitted Rule 1147 NOx emission test results that have completed SCAQMD staff review and demonstrated compliance with Rule 1147 emission limits as of March 2015. Table C-1 shows the number of test results and average NOx emission concentrations for units tested at the highest and at a low firing rate if applicable. In most cases the highest firing rated tested is the normal operating condition. However, in a small number of cases the low firing rate is the normal condition. The table also indicates the applicable NOx emission limit for each category of equipment. Table C-1 does not include results from tests that were subsequently repeated because the original test did not comply with test method or SCAQMD guidelines. In addition, the table does not include test results for units that were shut down or that were withdrawn by the unit operator.

Table C-1

Rule 1147 Emission Test Results

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Afterburner/ Regenerative Thermal Oxidizer	30 or 60 [2]	13	26	4	13
Afterburner/ Thermal or Catalytic Oxidizer	30 or 60 [2]	9	40	1	41
Afterburner/ Remediation Unit	60	2	23	1	24
Spray Booth (Automobile)	30	10	24		
Spray Booth (Other)	30	13	18	2	22
Crematory	60	20	50		
Dryer/Asphalt	40	1	35		
Fryer	60	7	29		
Fuel Cell Heater	30 or 60 [2]	1	11	1	9
Heated Tank	60	7	37	1	34
Metallizing Spray	30 or 60 [2]	1	22		
Metal Heat Treat	60	23	48		
Metal Melting (Large)	60	8	42	1	58
Metal Melting Pot/Crucible	60	5	54		
Multi-chamber Burn Off Oven or Furnace	30/60 or 60/60 [3]	11	42 [4]		
Multi-chamber Incinerator	30/60 or 60/60 [3]	1	54 [4]		
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		272		55	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.

[2] The emission limit depends upon the process temperature.

[3] The emission limit for the primary chamber varies depending upon process temperature.

[4] Average NOx emissions measured after the secondary chamber (afterburner).

Appendix D – Calculation of Cost Effectiveness

CALCULATION OF COST EFFECTIVENESS

Cost effectiveness calculations for this document are performed using the methodology in SCAQMD's BACT guidelines and cost effectiveness analyses for rule development. Note that there is one key difference in the calculation of cost effectiveness between the BACT Guidelines and rule development. For rule development, a best estimate of equipment's useful life is used in the calculation of cost effectiveness instead of a fixed 10 year assumption that is associated with financing of new equipment. In addition, in rule development various emission control options are evaluated to determine the option that provides the most reductions and reasonable cost effectiveness.

For new source review (NSR) under SCAQMD Regulation XIII, equipment for which BACT is defined must meet the emission limits defined by BACT regardless of the cost. This applies to equipment at both major and non-major sources (facilities). However, for permit applications for new equipment without established BACT at non-major sources, SCAQMD staff is required to evaluate the cost effectiveness of emission reduction options. New, modified or relocated equipment with a potential to emit of one pound per day or less are not required to comply with BACT by the SCAQMD.

The cost effectiveness analysis determines which emission reduction options are below the SCAQMD Board approved maximum cost effectiveness limits established by the SCAQMD BACT committee for equipment without minor source BACT. In addition, the SCAQMD BACT guidelines and rule development are required to calculate incremental cost effectiveness for the difference in cost and emission reductions between two or more emission control options. The cost effectiveness criteria for processes that do not have an established BACT is currently about $27,000 per ton of NOx for average cost effectiveness and about $81,000 per ton of NOx for the incremental cost effectiveness between two or more control options. A copy of the section of the SCAQMD BACT Guidelines that discusses calculation of cost effectiveness is included in Attachment 1 of this appendix.

Attachment 1 of Appendix D – Cost Effectiveness Methodology from Part C: Policy and Procedures for Non-Major Polluting Facilities of July 2006 SCAQMD Best Available Control Technology Guidelines

Attachment 1

Cost Effectiveness Methodology

Cost effectiveness is measured in terms of control costs (dollars) per air emissions reduced (tons). If the cost per ton of emissions reduced is less than the maximum required cost effectiveness, then the control method is considered to be cost effective. This section also discusses the updated maximum cost effectiveness values, and those costs, which can be included in the cost effectiveness evaluation.

There are two types of cost effectiveness: average and incremental. Average cost effectiveness considers the difference in cost and emissions between a proposed MSBACT and an uncontrolled case. On the other hand, incremental cost effectiveness looks at the difference in cost and emissions between the proposed MSBACT and alternative control options.

Applicants may also conduct a cost effectiveness evaluation to support their case for the special permit considerations discussed in Chapter 2.

Discounted Cash Flow Method

The discounted cash flow method (DCF) is used in the MSBACT Guidelines. This is also the method used in the 1999 Air Quality Management Plan. The DCF method calculates the present value of the control costs over the life of the equipment by adding the capital cost to the present value of all annual costs and other periodic costs over the life of the equipment. A real interest rate* of four percent, and a 10-year equipment life is used. The cost effectiveness is determined by dividing the total present value of the control costs by the total emission reductions in tons over the same 10-year equipment life.

Maximum Cost Effectiveness Values

The MSBACT maximum cost effectiveness values, shown in Table 4, are based on a DCF analysis with a 4% real interest rate.

Table 4: Maximum Cost Effectiveness Criteria (Second Quarter 2003)

Pollutant	Average (Maximum $ per Ton)	Incremental (Maximum $ per Ton)
ROG	20,200	60,600
NOx	19,100	57,200
SOx	10,100	30,300
PM_{10}	4,500	13,400
CO	400	1,150

The cost criteria [in Table 4] are based on those adopted by the AQMD Governing Board in the 1995 BACT Guidelines, adjusted to second quarter 2003 dollars using the Marshall and Swift Equipment Cost Index. Cost effectiveness analyses should use these figures adjusted to the latest Marshall and Swift Equipment Cost Index, which is published monthly in Chemical Engineering.

* The real interest rate is the difference between market interest rates and inflation, which typically remains constant at four percent.

Top Down Cost Methodology

The AQMD uses the top down approach for evaluating cost effectiveness. This means that the best control method, with the highest emission reduction, is first analyzed. If it is not cost effective, then the second-best control method is evaluated for cost effectiveness. The process continues until a control method is found to be cost-effective.

AQMD staff will calculate both incremental and average cost effectiveness. The new MSBACT must be cost effective based on both analyses.

Costs to Include in a Cost Effectiveness Analysis

Cost effectiveness evaluations consider both capital and operating costs. Capital cost includes not only the price of the equipment, but the cost for shipping, engineering and installation. Operating or annual costs include expenditures associated with utilities, labor and replacement costs. Finally, costs are reduced if any of the materials or energy created by the process result in cost savings. These cost items are shown in Table 5. Methodologies for determining these values are given in documents prepared by USEPA through their Office of Air Quality Planning and Standards (OAQPS Control Cost Manual, 4th Edition, USEPA 450/3-90-006 and Supplements).

The cost of land will not be considered because 1) add-on control equipment usually takes up very little space, 2) add-on control equipment does not usually require the purchase of additional land, and 3) land is non-depreciable and has value at the end of the project. In addition, the cost of controlling secondary emissions and cross-media pollutants caused by the primary MSBACT requirement should be included in any required cost effectiveness evaluation of the primary MSBACT requirement.

Table 5: Cost Factors

Total Capital Investment

- Purchased Equipment Cost
  - Control Device
  - Ancillary (including duct work)
  - Instrumentation
  - Taxes
  - Freight
- Direct Installation Cost
  - Foundations and Supports
  - Handling and Erection
  - Electrical
  - Piping
  - Insulation
  - Painting
- Indirect Installation Costs
  - Engineering
  - Construction and Field Expenses
  - Start-Up
  - Performance Tests
  - Contingencies

Total Annual Cost

Direct Costs
- Raw Materials
- Utilities
  - Electricity
  - Fuel
  - Steam
  - Water
  - Compressed Air
- Waste Treatment/Disposal
- Labor
  - Operating
  - Supervisory
  - Maintenance
- Maintenance Materials
- Replacement Parts

Indirect Costs
- Overhead
- Property Taxes
- Insurance
- Administrative Charges

Recovery Credits
- Materials
- Energy

Appendix E – Afterburner Technologies

AFTERBURNER TECHNOLOGIES

The afterburner category is comprised of a variety of technologies that are used to capture and incinerate VOCs, PM and toxic air contaminants. These include direct flame afterburners (often called an oxidizer or incinerator), regenerative thermal oxidizers (RTO) that heat a ceramic bed which oxidizes pollutants, and catalytic oxidizers which incinerate pollutants with the help of a catalytic matrix. Remediation systems for removing contaminants from soil or groundwater also use the same types of technologies to incinerate VOCs or toxic air contaminants.

Alternative non-combustion technologies for control of VOC, PM and toxic air pollutants are also available and include electrostatic precipitation, wet or dry scrubbers, carbon adsorption, and other filter media. Remediation systems and some other types of units may combine carbon adsorption or other technologies with a direct flame, catalytic or regenerative thermal oxidizer. An afterburner or oxidizer can also be as simple as a stack with a burner and pilot flame (i.e., a flare).

At the time of rule development, two sources of information were available to identify BACT for this category of equipment. BACT determinations had been made for flare based oxidizers. These determinations established a BACT/LAER limit for non-major and major sources of 50 ppm NOx. However, there were a significant number of flare based oxidizers that had been permitted with a 60 ppm NOx limit prior to that BACT determination. In addition, emission test results that varied across a range from below 30 ppm up to about 50 ppm NOx for new catalytic and regenerative thermal oxidizer systems were being used by the SCAQMD permitting group as the basis to require new applicants to meet equivalent emission limits. Given the variety of processes used as afterburners, their different emission characteristics and older equipment permitted at emission levels close to but above some current BACT levels, a rule NOx limit of 60 ppm was proposed for this category of equipment and adopted in Rule 1147.

Depending upon the type of afterburner system, different burners are used. Most of the RTOs tested use a high temperature Maxon Kinedizer burner but one uses an air heating burner from Eclipse – the Winnox burner. A Kinedizer burner is also used in a remediation unit that incorporates an RTO. Thermal and catalytic oxidizers use a variety of burners from Maxon, MidCo, Eclipse, and others. Some of these units use air heating burners and others use higher temperature burners such as the Eclipse Thermjet. A variety of burners are also used in remediation units that incorporate a thermal or catalytic oxidizer.

Newer flare based systems incorporate low NOx burners that can meet the 60 ppm NOx limit (e.g., John Zink and Flare Industries/Bekaert). However, RTO based systems offer a significant advantage over direct flame systems because they can significantly reduce fuel consumption and the cost of operating the system. Staff is aware of one facility that replaced an old flare based oxidizer with a new RTO in order to meet the Rule 1147 emission limit and to reduce fuel cost.

The afterburners that have been tested are used to control emissions from a wide variety of processes. Afterburners are widely used to control emissions of VOCs and PM from printing, coating and chemical manufacturing operations. Afterburners are also used for the control of VOCs from food bakery ovens and fryers. Larger coffee roasters are required to use afterburners to control emissions of PM, toxics and for odor control. One tested unit controls emission of PM from an animal feed dryer. Several of the tested units are portable and are used to control emissions of VOCs from degassing of storage tanks, pipelines and other equipment.

The 24 units tested easily passed the 60 ppm NOx limit. Most of the units were tested with their original burners. The RTO and remediation units have average NOx emissions of about 25 ppm at high fire with a range of 16 to 55 ppm. One unit with emissions of 55 ppm NOx has a Maxon Kinemax burner instead of a Kinedizer. Thermal and catalytic oxidizers averaged about 40 ppm NOx with a range of 21 to 54 ppm at high fire. Units with air heating burners including the Eclipse Winnox have lower emissions than units with high temperature burners such as the Eclipse Thermjet.

A large number of afterburner units using different combustion technologies have been tested and comply with the Rule 1147 NOx emission limit of 60 ppm. Most of the units complied with the emission limit using their original burners. The emission vary depending upon the combustion technology. However, all of the units for which tests were submitted and reviewed comply with the rule emission limit.

Appendix F – Spray Booths

SPRAY BOOTHS

A variety of coating operations use heated spray booths and prep stations. Prep stations are paint booths that are not fully enclosed. The majority of heated spray booths in the SCAQMD are auto body refinishing booths used for refinishing passenger cars and light trucks. Larger booths are used for industrial coating operations, large trucks and trailers and a variety of maintenance applications. In addition, auto body type spray booths are also used by manufacturing operations for drying and curing components and assembled products. An achieved in practice LAER/BACT limit of 30 ppm NOx for makeup air heaters in spray booth applications and the fact that many SCAQMD permitted booths are used as curing or drying ovens in manufacturing operations justified a Rule 1147 NOx limit of 30 ppm. It should be noted that BACT for ovens and most dryers has been 30 ppm NOx since 1998.

To date, only new or relocated spray booths have been subject to the Rule 1147 emission limit. Because more than 90% of in-use heated booths are estimated to have annual average emissions less than one pound per day of NOx, existing units are not subject to the emission limit until on or July 1, 2017. Most of the new booths have been installed in the SCAQMD are for auto body repair and have been permitted based on certification of the burner and related components of the makeup air unit for the booth.

Auto body repair businesses use paint booths for reducing the amount of spray leaving the facility and keeping dust off newly painted surfaces. In addition, booths speed up the drying process by moving air through the booth. Spray booths can also be fitted with heating units that further accelerate the drying and curing of coatings.

Auto body repair businesses use heated booths in order to increase the number of painted cars that can be dried in a day. Businesses that coat four or more cars a day use heated booths. About three painted cars can be dried each day with an unheated booth. According to spray booth vendors, the average number of cars dried per day in a spray booth is about five. The maximum number of cars that can be processed by a heated booth during one shift is eight. Some auto body repair businesses operate more than one shift per day thus increasing the number of cars processed.

Technology

Ten booths used in auto body repair from a variety of manufacturers have been tested as part of the process to certify a company's spray booth heating systems. These certified units comply with the Rule 1147 emission limit of 30 ppm NOx and with workplace exposure standards for CO. To date, all of the certified spray booths have used a burner system from MidCo. This new low NOx burner replaced line burners in a number of booth manufacturers heating units. Many of the previous units were built around a MidCo line burner. Since 2010, more than 125 low NOx heating systems based on the MidCo low NOx burner have been installed in the SCAQMD. The majority of these have been installed in heating units for new auto body spray booths.

Several spray booth manufacturers have taken advantage of the option to certify their booths and heating system. Certified models do not require individual emission tests. Currently there are 32 models of booths and heating systems from eight manufacturers certified compliant with the Rule 1147 emission limit. Non-certified models must perform individual tests in order to receive an SCAQMD permit. The SCAQMD certified systems vary from basic cross flow booths to down flow booths constructed with below ground air exhaust systems. The manufacturers represent a significant portion of the industry and include companies that manufacture their booths and heating systems in California.

The SCAQMD permitting group certifies the whole spray booth mechanical system including the combustion components. This approach significantly increases the cost of retrofitting existing spray booths with certified low NOx burners. To use an SCAQMD certified burner on a used spray booth, the owner/operator must also install a new heater box, blower, other mechanical components with a new thermostat and control system for moving air in addition to installing the burner, mounting hardware and combustion control system.

Other manufacturers have decided not to certify their heating units, but instead have decided to have their distributors and local installers test each new installation. For example, three auto body booths at one location have been tested and complied with the Rule 1147 NOx limit using a newer design line burner from Maxon.

Other types of booths and some auto body booths used for different applications have also been tested and comply with the Rule 1147 emissions limit. These units submitted individual emission test results. Thirteen test results have been submitted for booths that are not used for auto body repair. These booths use heating units or burners from Hastings, MidCo, PowerFlame, and Riello. In these cases, the air movement system and other components were not required to be replaced by the SCAQMD.

The burners in these other booths use a variety of technologies to achieve the emission limit of 30 ppm. The heater manufactured by Hastings is a roof mounted unit that can also be used to heat other processes or large building spaces such as a warehouse. All of the burners in these systems use premixing of air and fuel with a controlled amount of excess air to reduce emissions. The MidCo burner uses a knit steel fabric material to stabilize and spread the flame over a larger surface area to reduce peak flame temperature and NOx emissions. The Hastings, PowerFlame and Riello burners use premixing, swirl for mixing with air in the combustion zone and other technologies to keep emissions low. The new control systems for these low NOx burners can be the most important component of the system because they provide more precise tuning and control of the combustion process across the firing range of the burner.

Cost Effectiveness of Rule Compliant Spray Booth Heating Systems

NOx Emissions for most auto body spray booths average less than on half pound per day on an annual basis. NOx emissions contribute to the formation of secondary particulates in addition to ozone. A typical booths' annual average NOx emissions are less than one third pound per day. However, during late fall and winter when PM 2.5 concentrations can be high, daily NOx emissions can be two to three times annual average emissions.

The cost difference between a new certified rule compliant heated spray booth and a new non-compliant unit is less than $10,000 on typical new booth based on information from manufacturers, vendors and the cost of booths prior to rule adoption. The cost for new units includes markups from the booth manufacturer applied to the cost of the burner, gas train and control system. Most of the specialty booths used for applications other than auto body repair were tested with standard burners, so there was no additional equipment cost to comply with Rule 1147 limits. However, the cost for adding a new natural gas fired certified heating system to an existing spray booth varies from $30,000 to $50,000 with a typical cost of about $40,000. The cost varies depending upon the manufacturer, type of booth and the individual installation.

The cost of new booths are highly variable depending upon the type of booth and options. According to vendor supplied information, the cost to purchase and install a new spray booth is about 20% higher than in 2008 when Rule 1147 was adopted. This increase is consistent with industry data on the cost to purchase and install new equipment (i.e., Marshall & Swift Equipment Cost Index which includes inflation, the cost of materials and manufacturing costs). The typical new installation is a semi down draft (side draft) booth with for about $80,000. A new basic cross draft booth without recirculation is less and costs $65,000 to $80,000. However, some vendors do not sell heated cross flow booths. The heating system and installation cost of the booth and heating constitute most of the cost for a new basic cross draft booth. A new full down draft booth is about $115,000 and up depending upon options. Although the cost for semi down draft and down draft booths are higher than for a basic cross draft, the heating system costs are about the same for basic and premium booths from the same manufacturer or vendor.

The cost effectiveness for a new SCAQMD certified low NOx auto repair booth is at most $22,000 per ton [($10,000 at most) / (70% reduction in NOx) X (0.25 lb/day / 2000 lb/ton) X 260 days/year X 20 years)]. In higher volume shops, the cost effectiveness is better (lower than $22,000/ton).

The cost to retrofit a used booth to install in the SCAQMD as a new permitted unit is significantly less than purchasing a new booth. However, the cost effectiveness for retrofitting an existing in-use auto repair booth with a SCAQMD certified heating system is $88,000 per ton of NOx reduced based on a cost of $40,000 and a 20 year life. The cost of the heating system ranges from $30,000 to $50,000. For a high volume booth used two shifts a day, the cost effectiveness could be less than half this value ($44,000/ton). For a booth retrofit costing $30,000 the cost effectiveness is $66,000 per ton. This cost effectiveness of retrofitting an existing permitted booth is higher than the minor source average cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment without defined BACT. Depending upon the number of cars processed per day, the retrofit cost effectiveness may also be higher than the BACT incremental cost effectiveness criteria of $81,000 per ton.

It must be noted that depending upon the age of the used booth, the owner may have to upgrade the booth to meet current building and safety codes. The local building and safety agency may require mechanical, electrical, fire safety and other components be upgraded or replaced. These costs are not attributable to Rule 1147 and are also not included in the cost effectiveness analysis for new, modified or relocated units that require a new SCAQMD permit. The SCAQMD BACT Guidelines does not include the cost of compliance with non SCAQMD regulations in the calculation of cost effectiveness. The calculation of cost effectiveness is an analysis of the cost of new equipment and the cost of operating the new equipment. In the cost effectiveness analysis for new rule requirements, the recurring costs for new or modified equipment are those above and beyond the costs associated with original existing equipment.

The cost effectiveness for upgrading existing spray booths to comply with the Rule 1147 emission limit exceeds the minor source cost-effectiveness criteria of $27,000 per ton used by SCAQMD for equipment categories without a defined BACT. However, the cost effectiveness for new units is at most $22,000 per ton and is less than the BACT Guidelines criteria. Because the cost effectiveness to retrofit an existing permitted booth is significantly higher than the minor source BACT criteria, staff is considering amending Rule 1147 to delay compliance for existing in-use permitted booths and heating units until they are modified (modification of the combustion or air circulation system), relocated (including moved to a different location within the facility) or replaced. Staff is proposing that new, modified, or relocated units requiring an SCAQMD permit continue to be required to comply with the Rule 1147 NOx limit at the time of modification or installation. A change of ownership in a business with an existing in-use permitted booth would be exempt from the retrofit requirement unless the booth or heating unit is modified, relocated or replaced.

Appendix G – Crematories

CREMATORIES

Twenty crematories have been tested and comply with the Rule 1147 NOx emission limit. This list includes units tested with their original burners and units tested after replacing their burners. The burners tested in these units are manufactured by Eclipse, Facultatieve and others. The most common burner installed for new units in the SCAQMD and for replacing old burners is the Eclipse Thermjet, a medium to high velocity burner used in many high temperature applications including kilns, metal melting, heat treating and burn off furnaces.

Crematories are constructed as two integrated chambers each with their own burners. The first chamber is used for incineration and the second is an afterburner for reducing emissions of PM, VOCs and odors. Typically both chambers use the same type of high temperature burner but the size and number of burners in each chamber may differ. The primary chamber typically has one or two smaller burners than the one burner used in the secondary chamber afterburner section.

The Rule 1147 NOx emission limit for crematories is 60 ppm. The NOx emission concentrations for the tested crematories average 50 ppm with a range from 30 to 59 ppm. The 20 crematory tests that have been reviewed and comply with the emission limit include those with original burners and many units with new burners and control systems. Many crematories more than 20 years old had burners that are no longer produced and would not comply with the Rule 1147 emission limit. However, those crematories replaced their burners and comply with the 60 ppm NOx emission limit. Most crematories less than 20 years old have been installed with burners that comply with the Rule 1147 NOx emission limit and will not require replacement a retrofit. These units will only be required to demonstrate compliance through an emissions test.

The Rule 1147 test program has demonstrated that the NOx emission limit of 60 ppm is achieved by the burners and combustion control system available since the late 1990s. Crematories that have had their burners replaced use the same burners that are installed in new units. The average emission concentration from the tested units is 50 ppm and some units are significantly lower.

Appendix H – Fryers

FRYERS

There are two major types of fryers – conveyor and batch type. In addition, there are different types of heating systems including immersion tube heating in conveyor units and external oil heating systems for many batch type fryers. The external oil heaters use a heat exchanger with a gas fired burner or another heat source such as a thermal fluid heater regulated by SCAQMD Rules 1146.1 or 1146.2. Both types of fryers and heating systems have been tested and comply with the rule 1147 emission limit.

Seven existing in-use fryers have completed emission testing and comply with the Rule 1147 NOx emission limit of 60 ppm. The tested units are from three different manufacturers. All units were tested with their original burner systems. One unit is a conveyor fryer with many small immersion tube burners and a total heat rating of 1.5 mmBtu/hour. The other units use single burners with a heat exchanger and have heat ratings from 1.5 to 2.5 mmBtu/hour. The average NOx emissions are about 30 ppm with a range from 14 ppm to 56 ppm.

A variety of systems from three different manufacturers have been tested and comply with the Rule 1147 NOx emission limit. The units complied with the 60 ppm using different types of heating systems. Based on the units completing testing, the Rule 1147 emission limit is achievable with the original heating systems installed for these fryers.

Appendix I – Heated Process Tanks

HEATED PROCESS TANKS

Heated process tanks, parts washers and evaporators are a category of 1147 equipment for which it is difficult to accurately estimate the number of units that are subject to Rule 1147. While evaporators and parts washers with an integrated heated tank are typically separate units with their own permit, most process tanks are permitted as part of a process line with other processes and tanks. Because Rule 1147 only applies to units that require a permit; an individual tank is only subject to Rule 1147 if it is heated by burners and either has emissions of VOC, PM or toxic air contaminants or the rating of the burner system is greater than two million BTU per hour (2 mmBtu/hour).

For example, tanks with mixing from an air sparging system are more likely to have VOC, PM or toxic emissions and require emission controls and a permit than those that do not. Otherwise a tank is exempt from the requirement for a permit as defined by SCAQMD Rule 219. However, if a process tank does not require a permit, it is still included in the description of a process line in order to provide a complete description of the process for SCAQMD permitting and compliance staff. Process lines are permitted as one unit in order to reduce the cost and administrative burden of permits.

There are approximately 1,400 process tanks identified in the SCAQMD permit system. About 1,200 of them are unheated, heated electrically or heated by a boiler. Of the remaining 200, at least 160 have burners rated less than the size requiring a permit. The number of heated process tanks subject to Rule 1147 is estimated to be between 20 and 40 with a best estimate of 25 units. The heat ratings of process tanks subject to Rule 1147 varies from 2.2 to 9 mmBtu/hour. Staff has also identified 23 evaporators with SCAQMD permits that are potentially subject to Rule 1147. There are also an unknown number of parts washers that are potentially subject to Rule 1147 depending upon their size, configuration and emissions. Tanks, evaporators and washers with electric, boiler steam or thermal fluid heating are exempt from Rule 1147. Equipment heated using a separate enclosed heated tank are potentially subject to SCAQMD Rules 1146, 1146.1 or 1146.2 which regulate boilers and enclosed process heaters.

Many heated process tanks, evaporators and parts washers use immersion heating tubes to heat a solution in a tank. Immersion tube burners fire into and heat a tube and that heat is transferred to the solution from the tube by conduction and convection. The efficiency of heat transfer depends upon the diameter and length of the tube. The efficiency of heat transfer in a tank system can vary from about 60% to over 90%.

To date only a few heated process tanks and evaporators have performed testing because some were installed within the last 15 years, others have emissions less than or equal to one pound per day and most are exempt because they do not require a permit. Seven units have been tested and reviewed by SCAQMD staff. None of these units replaced their burners. All tested units comply with the Rule 1147 NOx limit of 60 ppm for heated process tanks, evaporators and washers with their original burners.

Process tanks, evaporators and washers with their own burners use a variety of heat exchange systems to heat a solution or assist in evaporation. Most process tanks use a constant diameter tube to heat a solution. Evaporators either use custom designed air to solution heat exchangers or constant diameter tubes to provide heat to a solution. Most parts washers use a custom designed heat exchange system or a separate water heater.

Custom designed heat exchange systems have various configurations but start out with a combustion zone with a larger cross section than the remainder of the heat exchanger. These systems typically start with a combustion chamber that is about 8 to 16 inches across that extends the full length of the burner's flame. The combustion section of the heat exchanger is large because manufacturers use burners that are designed for a wide variety of applications including boilers, furnaces and ovens.

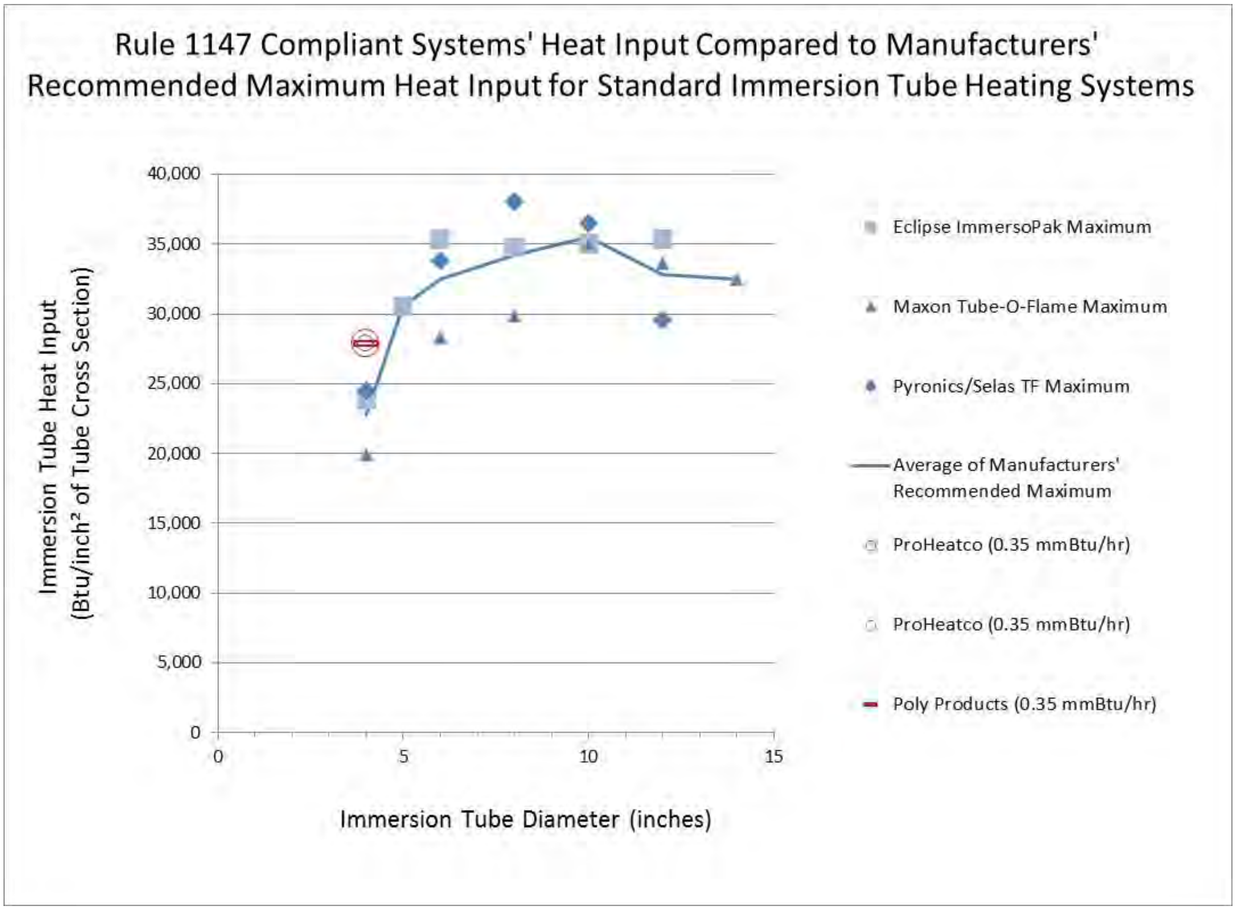
Emission testing has been performed on three evaporators using custom designed heat exchangers – two units from Encon using MidCo burners and one unit from Lakeview Engineering unit using a burner from Industrial Combustion. The heat input for these systems are 220,000 and 650,000 Btu/hour for the Encon evaporators and 1.5 mmBtu/hour for the unit built by Lakeview Engineering. NOx emission for these units ranged from 25 to 52 ppm.

Most process tanks and some evaporators use a constant diameter tube system and immersion tube burners to heat the solution tank. However, there are three types of heat exchange systems using constant diameter tubes. Each system has its own range of tube diameter depending upon the amount of pressure the burner produces and the allowable heat input to an individual tube. In addition, burners for these systems can be set up in a variety of ways depending upon the type of process tank. Burners can be set to fire at a maximum firing rate and off, fire at a high and low rate or modulate and fire across the whole range of the burner. Burners can also be set to fire at a fixed amount of combustion air or variable amount of combustion air in order to maintain a constant ratio of fuel and air over the firing range of the burner.

The most common heating tube system typically has tubes that vary from about four inches up to 14 inches in diameter. Burners for this system are available from many manufacturers including Eclipse, Maxon, Selas/Pyronics and Titan Engineering. The heat input in this type of system varies from about 20,000 to 30,000 Btu per square inch of tube cross section in four and five inch tubes and 25,000 to 40,000 Btu per square inch in six to 14 inch diameter tubes. Three of these systems have been tested – two heated evaporator tanks from Proheatco and one heated evaporator tank from Poly Products. All of these systems use a burner with a maximum rating of 350,000 Btu/hour and 4 inch diameter heating tubes. NOx emissions from these three units vary from 30 to 55 ppm. In addition, preliminary testing of a unit at another facility with a higher output burner of about 3 mmBtu/hour indicates that unit has NOx emissions of 40 to 50 ppm.

Figure I-1 provides a summary of burner and tube characteristics of the three tested units from Proheatco and Poly Products. The figure illustrates that the units have firing rates (heat input per square inch) near the maximum recommended by three major manufacturers for the most common type of tube immersion tube heating burners. This metric is important because it impacts the formation of NOx in the heating tubes. The information presented in Figure I-1 and the emission test data indicate that it is technically feasible to comply with the Rule 1147 NOx limit with the most common type of immersion heating burners.

Figure I-1



A second type of tube heating system uses burners that produce higher pressures and can fire into smaller diameter tubes. This type of system uses tubes two to eight inches in diameter with heat inputs per tube cross sectional area double the heat inputs of the standard system discussed above. Eclipse, Maxon and PowerFlame manufacture burners for this type of application. There are currently no emission test results available for these types of burners so it is not possible to determine if they comply with the Rule 1147 NOx emission limit of 60 ppm.

A third type of tube heating system for process tanks has been installed in new heated tanks. This system has a new type of burner from Maxon (an XPO burner) that requires larger diameter tubes (14 inches and above). An SCAQMD approved emissions test on one of these systems (required for Regulation XIII and new source review) with a 3.3 mmBtu/hour burner showed emissions of 4 ppm NOx at high fire and 34 ppm at low fire.

The Rule 1147 testing program has identified three types of heating systems used in process tanks and evaporators that comply with the NOx emission limit. There is no information yet available for a fourth type of heating system that uses high pressure burners firing into smaller diameter tubes of 2 to 8 inches. A fifth type of tank heating system with tube firing burners used in heat treating also been demonstrated to meet the 60 ppm NOx limit but have not yet been tested in heated tank applications.

For all five types of tank heating systems, the burners and heat exchangers or tubes are designed as one integrated system. If an individual heated tank or evaporator system using any of the four systems does not comply with the emission limit, then the whole tank will likely have to be replaced. Delaying compliance for existing in-use units from the rule emission limit until the combustion system is modified or replaced will address the issue that it is not feasible to retrofit an existing heated tank with different burners. If a tank is retrofitted with new burners, the owner will replace the heating tubes or heat exchanger. If the owner rebuilds a process tank, then a rule compliant system can be installed at that time.

SCAQMD staff is considering to amend Rule 1147 to delay compliance with the NOx emission limit for existing in-use process tanks, evaporators and parts washers with an integrated heated tank until the combustion system is modified or replaced. New units would still be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour. Staff estimates this change would affect less than 50 heated tanks and evaporators currently subject to the Rule 1147 emission limit. There are more than 1,200 process tanks which are not subject to Rule 1147 requirements because they are exempt from the requirement for a permit by SCAQMD Rule 219, are unheated or are heated electrically or with a boiler.

Appendix J – Heat Treating

HEAT TREATING

Heat treating typically involves heating metals or alloys in a furnace or oven in order to develop specific properties in the metal or alloy before and after a part is made. However, heating can also be used to treat metals and nonmetallic refractory materials in a manufactured vessel, furnace or other product using temporary burners systems. The burners used in these systems are the same kinds of burners used in direct fired heat treating furnaces and kilns. Kilns are used for heat treating products made from ceramics, clay and other non-metallic materials.

Metal heat treating temperatures vary from a few hundred degrees Fahrenheit, used in tempering, to over 2,100 degrees for forging steel and titanium. With the exception of tempering, steel and titanium alloy heat treatments are typically at higher temperatures than for non-ferrous alloys based on aluminum. Kilns processing non-metallic materials also vary temperature depending upon the material and final product.

The type of burners used for heat treating depend upon the temperature required and whether they fire directly into the furnace or into tubes and heat is then transferred from the tubes to the furnace by fans. Lower temperature heat treating ovens have burners that are typically found in other types of ovens including air heating burners such as Eclipse Winnox and Maxon Cyclomax burners. Higher temperature direct fired furnaces typically use a different type of burner with a higher flame velocity, longer flame length and more radiant heat output for heating refractory material in the furnace or the tubes they fire into. High velocity burners are also used because they increase mixing and eliminate temperature stratification in direct fired furnaces. The new control systems for these low NOx burners are an important component of the system because they provide more precise tuning and control of the combustion process across the firing range of the burner.

Indirect fired furnaces typically have specialized tube firing burners. However, high velocity burners, similar to those found in direct fired applications, have also been used in indirect fired furnaces permitted in the SCAQMD. Temperature stratification in indirect fired furnaces is avoided because large fans move the air in the furnace past the tubes and into the section where the material being treated is held. High velocity and tube firing burners are available from many manufacturers including North American/Fives, Bloom, Eclipse, Maxon, Hot Work, Hauck, Industrial Combustion, and Selas. Tube firing burners from a number of manufacturers including Bloom, Hauck, North American/Fives, and Eclipse also have an option to add flue gas recirculation (FGR) to reduce NOx emissions.

Heat treating furnace designs have evolved over time. Newer furnace designs have more and smaller burners than many earlier designs. For both direct and indirect fired furnaces, more burners provide better control of the temperature profile in the furnace. Finer control of the furnace temperature allows the operator to meet newer more stringent temperature uniformity requirements than those that were in existence when older furnace designs were first built. Some of the older furnace designs predate modern temperature uniformity standards developed since the 1970s. The number and type of burners used in a furnace depend upon the size of the furnace, type of heat treating, process temperature and temperature uniformity requirements of the heat treating processes performed by the furnace.

Figures J-1 to J-4 summarizes the size and number of burners in the heat treating furnaces that have successfully completed emission testing. This information indicates that most of the burners used have heat ratings of 0.5 mmBtu/hour (500,000 Btu/hour) or less and the largest burners are about 2 mmBtu/hour. The largest furnaces have a heat rating of about 8 mmBtu/hour. There are furnaces permitted in the SCAQMD with larger heat ratings, but they are found at facilities in the RECLAIM program and are exempt from Rule 1147.

Figure J-1

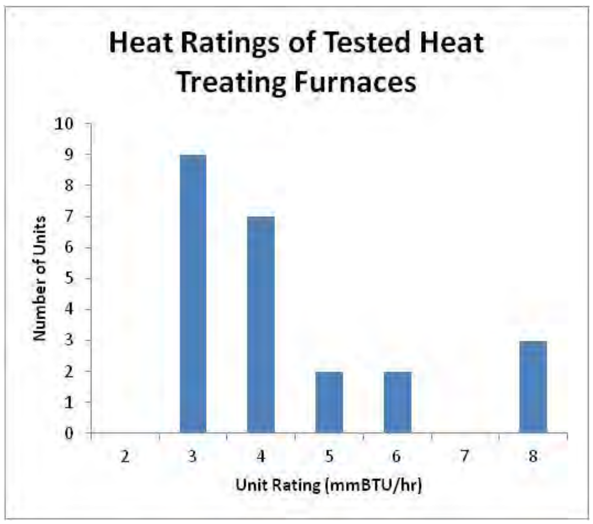


Figure J-2

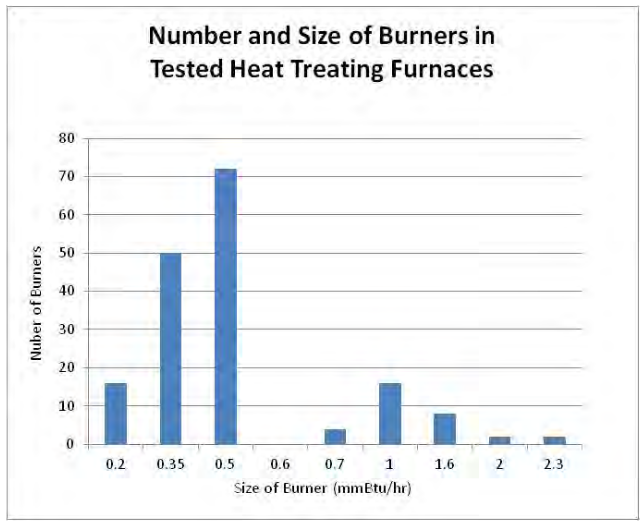


Figure J-3

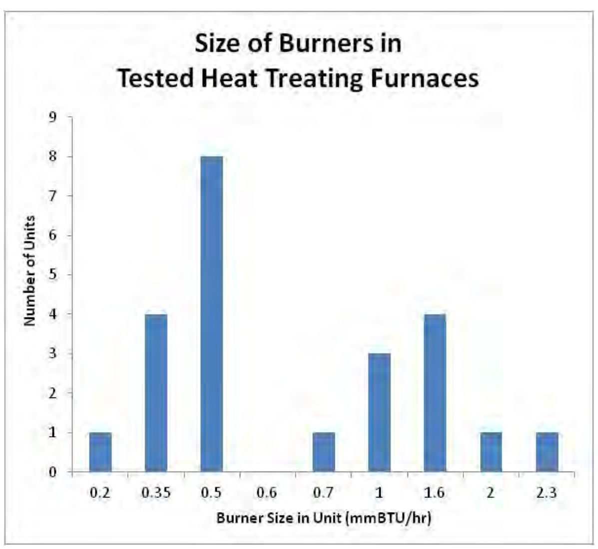
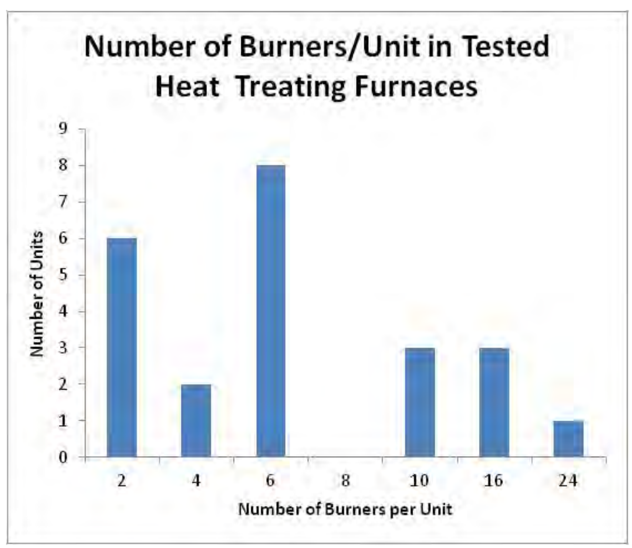


Figure J-4



The emission test results for heat treating furnaces indicate most furnace NOx emission concentrations are in the range from 45 ppm to 55 ppm with an average of about 50 ppm. These results cover a variety of furnaces processing aluminum and steel alloys across a broad temperature range. Some of the furnaces were new and were required to meet the new source BACT requirement of 50 ppm NOx, but most have been in use long before Rule 1147 was adopted in 2008 and before the BACT limit of 50 ppm was put in place in 2000. To date, only a few furnaces have had their burners replaced, added an FGR system or replaced their furnace in order to comply with Rule 1147. Most heat treating furnaces tested have met the Rule 1147 emission limit with their existing burners.

Kilns use the same burners that are found in direct fired heat treating furnaces and crematories. Kilns are used to heat treat clay, ceramic and other nonmetallic materials. Kilns are also used to heat treat glazes and other coatings applied to products made from these materials. Rule development staff have not yet received new emission test results for kilns from the Rule 1147 testing program. However, there were a number of emission tests completed on small and large kilns prior to rule adoption in 2008 and the rule amendment in 2011. These test results are summarized in Appendix B of this document. The emission test results demonstrate that a variety of kilns comply with the Rule 1147 emission limit of 60 ppm NOx with the burners installed prior to rule adoption. In addition, many small kilns are not subject to Rule 1147 because they are exempt from the requirement for a permit under SCAQMD Rule 219 (some of these use electric heat).

Appendix K – Metal Melting

METAL MELTING

A variety of metal melting furnaces are subject to Rule 1147. They include small pot and crucible furnaces for melting lead, lead alloys, aluminum, zinc and zinc alloys and larger units including kettle furnaces for galvanizing and reverberatory furnaces for melting aluminum. There are about 170 metal melting furnaces potentially subject to Rule 1147 NOx emission limits. Most of the furnaces subject to Rule 1147 melt non-ferrous metals and alloys. Furnaces for melting iron or making steel are often electric and therefore not subject to Rule 1147. There are also many furnaces at large facilities which are exempt from Rule 1147 because the facility is in the RECLAIM program.

To date, most of the metal melting furnaces tested complied with the Rule 1147 NOx limit with the burners in place when the rule was adopted. All of the larger kettle and reverberatory furnaces passed the emission limit with their original burners. However, one kettle furnace and one reverberatory furnace were recently built to replace older units and were subject to BACT under new source review. The four larger furnaces whose permits identified the burner manufacturer had Eclipse burners.

Of the five small pot and crucible melting furnaces tested, three furnaces met the emission limit with their original burners. The other two units had their burners replaced before testing. This type of furnaces can be built with burners from many manufacturers including Eclipse, Maxon, MidCo and others. One pot furnace had its original burner replaced with an Eclipse Ratio Air burner in order to comply with the NOx emission limit of 60 ppm. The new burner also had low CO emissions. A second company chose to replace two burners on a large pot furnace (2 mmBtu/hour originally) with one larger 2.4 mmBtu/hour Maxon Kinedizer LE burner, but it is not known whether the original burners would have met the Rule 1147 NOx limit. The burners were replaced in order to increase production of the furnace and to reduce fuel consumption and emissions. The new configurations was subject to BACT under new source review and complies with the Rule 1147 NOx emission limit and has low CO emissions.

The heat ratings of the pot/crucible furnaces tested ranged from 0.5 - 2.4 mmBtu/hour. The NOx emissions for these pot/crucible furnaces were in the range of 49 to 60 ppm. The eight kettle and reverberatory furnaces have unit heat ratings from 1.2 – 6 mmBtu/hour with emission ranging from 40 ppm to 53 ppm. However, the units greater than 4 mmBtu/hour have multiple burners rated 1.2 – 1.5 mmBtu/hour. The highest heat rating for a unit with one burner is 2 mmBtu/hour. There are furnaces with larger heat ratings permitted in the SCAQMD, but they are at facilities in the RECLAIM program and are exempt from Rule 1147.

The eight metal melting furnaces tested complied with the Rule 1147 NOx emission limit. Two of the units were new and built to replace old units. It is not known whether the old units would comply with the emission limit. One pot/crucible furnace was rebuilt with a larger burner to increase capacity. Another small pot furnace had its burner replaced to comply with the Rule 1147 NOx emission limit. All of the unmodified units, the new units and the units with replaced burners complied with the rule emission limit.

Appendix L – Multi-chamber Burn-off Ovens and Incinerators

MULTI-CHAMBER BURN-OFF OVENS AND INCINERATORS

This category includes various equipment that are used for similar purpose but named differently. These units may be called burn-off or burn-out ovens, kilns or furnaces and incinerators. However, all of the units perform a similar function and operate in a similar fashion. They are built with a primary chamber for melting, vaporizing or pyrolizing some material on a part or piece of equipment in order to recycle the material or component. Some units are used for incinerating material that cannot be reclaimed or must be incinerated prior to disposal. The primary chamber leads to an integrated secondary afterburner chamber that destroys particulate matter, carbon monoxide, VOCs and any other organic material that enter this afterburner section. The incinerated material is reduced to carbon dioxide and water vapor.

The Rule 1147 NOx emission limit for the primary chamber of a furnace depends upon the process temperature in this burn-off chamber. If the process temperature exceeds 800 °F, then the NOx emission limit in the primary chamber is 60 ppm. If the process temperature is lower, then the NOx limit is 30 ppm which is consistent with a typical oven or low temperature furnace operating at those temperatures. The NOx limit for the secondary afterburner chamber is 60 ppm NOx and the same as for other afterburners.

Twelve burn-off ovens, furnaces and incinerators have completed review of their test results. Most units were tested with original burners. The number of burners in these units varies from two to six burners and the most common configuration has two or three burners. The heat ratings of the units range from 0.5 to 2.2 mmBtu/hour. The average NOx concentration in the stack after the afterburner section is less than 45 ppm and the range is from 26 to 54 ppm.

Discussion with a local manufacturer of burn-off furnaces indicates that it is not possible to use the preferred type of burner and meet a 30 ppm emission limit in the primary chamber for a process temperature less than 800 °F. The typical burner that is used to remove materials from a part is the same type of high temperature medium to high velocity burner used in crematories, kilns, heat treating and some types of afterburners. These burners are designed to have NOx emissions in the 40 to 60 ppm range.

The manufacturer has tested a design with an air heating burner in the afterburner section to achieve emissions of less than 30 ppm in the secondary chamber and meet an average emission limit for the two chambers of less than 45 ppm NOx. However, this redesign will not achieve the required PM, VOC and carbon monoxide reductions in all applications. In addition, using the averaging provision of the rule may not always achieve compliance with the NOx limit. Company representatives have suggested that since it is not always possible to comply with the emission limit of 30 ppm in the primary chamber of these types of devices, the NOx limit in the primary chamber should be 60 ppm NOx regardless of the process temperature. SCAQMD staff agree with this assessment and are considering a rule change that the NOx emission limit in both chambers of this type of equipment should be

60 ppm at any process temperature. This change in the rule limit would affect a small number of equipment regulated by Rule 1147.

Appendix M – Ovens and Dryers

OVENS AND DRYERS

Excluding spray booth systems, the number of ovens and dryers under permit in the SCAQMD is slightly less than 1,200 units. This is the second largest category of equipment regulated by Rule 1147. These units are used in a variety of processes including curing of coatings and other materials, drying coated and printed products, and drying materials. The oven or dryer can be a small enclosed batch oven with a heating system, a large walk in oven, a conveyor system with a coating tank or coating spray station followed by a heated oven, or a drying room with a unit heater. Some printing and all textile drying operations use large conveyor units with multiple burners for high speed production of large quantities.

There are a variety of burners used in ovens and dryers. Each type of burner has its own characteristic emission profile. For example, radiant infrared burners have low emissions and NOx concentrations are typically less than 20 ppm. The most common type of burners used are nozzle mixing air heating burners. Some of the same types of ovens use premix burners with a metal fiber fabric cylinder or panel as a flame holding surface. Other units are designed to use line type air heating burners. Some small ovens and large conveyor systems use many flat panel radiant infrared burners. Powder coating operations are one of the processes that use radiant burners. Radiant infrared burners are required to directly heat a part in order to melt and then cure the coating. Ovens in which combustion gases cannot come in contact with the produce use indirect fired heater units with an air to air heat exchanger to provide clean heated air to the oven. However, both direct and indirect-fired unit heaters can be used to provide heat and move air through large drying ovens or rooms.

Ovens subject to the Rule 1147 NOx emission limit use burners from a number of manufacturers. The most common burners used in the SCAQMD are line and nozzle mix burners manufactured by Eclipse and Maxon. Two thirds of the tested ovens and dryers use Maxon burners and one fourth of the units use Eclipse burners. Eclipse burners used in compliant ovens and dryers include the Eclipse Winnox and Linnox product lines. Maxon burners used in compliant ovens include several versions of the OvenPak series, the Cyclomax, the LN-4 line burner and the Kinedizer. However, low NOx burners from other manufacturers including MidCo, PowerFlame, Riello, and Yukon also comply with the Rule 1147 NOx emission limit. The newer control systems for these low NOx burners are the most important component of the combustion system because they offer more precise tuning and control of the combustion process across the firing range of the burner.

Most ovens and dryers tested use only one burner. However, coating, printing and curing lines often have multiple burners. Many coating and printing lines use two identical burners, but the oven section of a coating line can also have up to 40 infrared radiant panels.

The tested ovens' heat ratings varies across a wide range from 0.4 mmBtu/hour for a small batch oven up to 20.5 mmBtu/hour for a large rotary dryer. However, most ovens have ratings less than 2.5 mmBtu/hour. Most burners in ovens with multiple burners are also less than 2.5 mmBtu/hour. The most common size of burner installed in all types of oven is 1.0 mmBtu/hour.

Figures M-1 through M-4 identify burner heat rating, number of burners and the range of the heat ratings for the tested units. Printing oven and textile dryer data is not included in Figures M-1 and M-2. Printing oven data is summarized in Figures M-3 and M-4.

Figure M-1

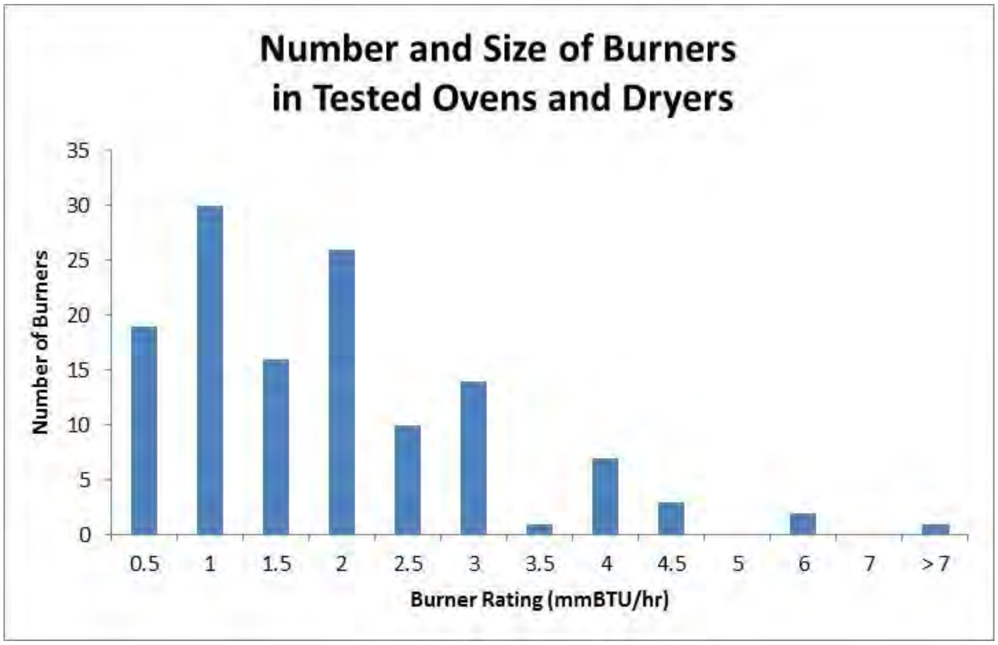


Figure M-2

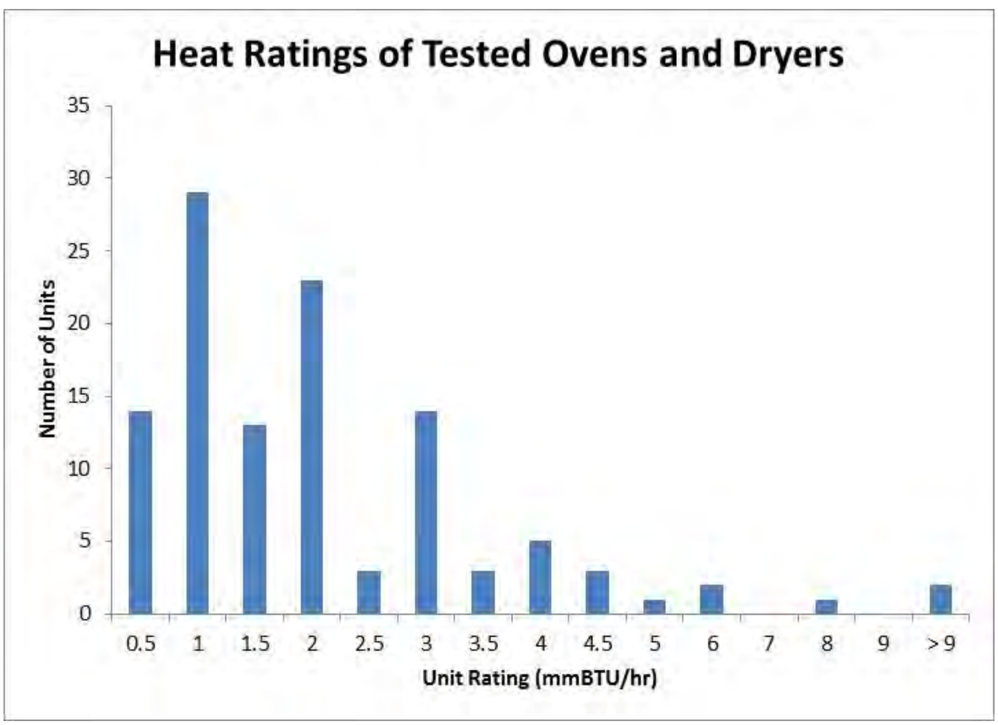


Figure M-3

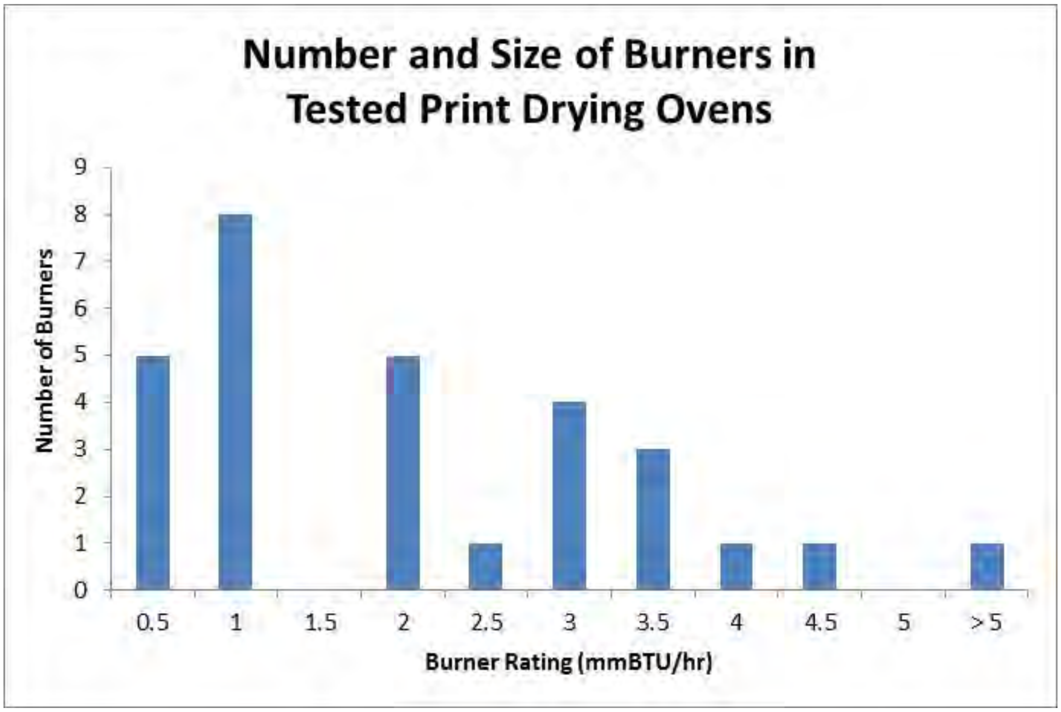
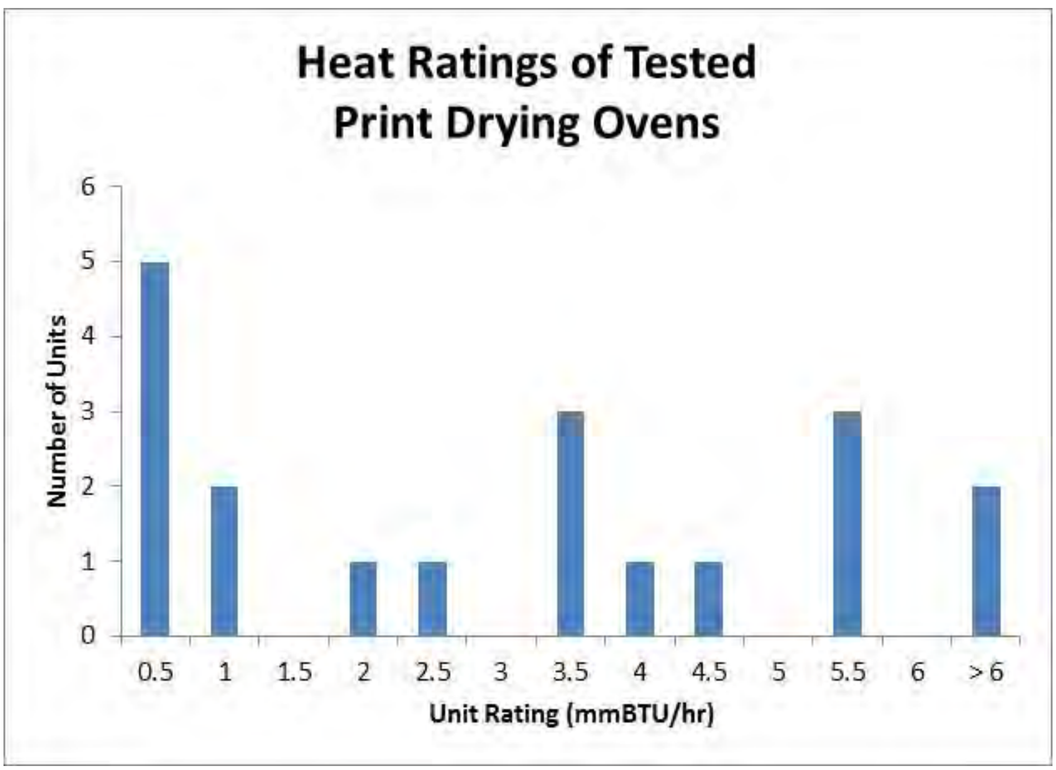


Figure M-4



Printing oven and dryer heat ratings vary from about 0.4 mmBtu/hour to 7.4 mmBtu/hour. The most common burner size in these ovens is also 1.0 mmBtu/hour. Textile tenter dryers typically have eight or nine burners that are rated less than 1.0 mmBtu/hour. The other type of textile dryer typically has four burners each rated about 1.0 mmBtu/hour.

The emission test results for ovens and dryers indicate that all types of units tested comply with the Rule 1147 NOx emission limit. Table M-1 provides a summary of the completed Rule 1147 emission tests for ovens and dryers. At this time, 140 units used for a variety of processes have approved test results and comply with the 30 ppm NOx limit. The average emission concentration for most ovens and dryers is about 20 ppm NOx. The average emission concentration for textile dryers is about 25 ppm NOx. The range of emission concentrations for all ovens and dryers is from 4 ppm to 30 ppm. The range emission concentrations for printing lines and ovens is 4 ppm to 29 ppm and for textile dryers is 14 ppm to 27 ppm. In addition, two ovens complied with the rule limit by averaging emissions from the oven and an afterburner that must comply with a NOx emission limit of 60 ppm.

Table M-1

Rule 1147 Emissions Test Results for Ovens and Dryers

Equipment Category	Rule 1147 NOx Limit (ppm [1])	Number of Units Tested at Normal/High Fire	Average NOx Concentration at Normal/High Fire (ppm)	Number of Units Tested at Low Fire	Average NOx Concentration at Low Fire (ppm)
Oven/Dryer	30 or 60 [2]	112	20	35	21
Print Dryer/Oven	30	19	20	4	23
Textile Shrink Dryer	30	2	24		
Textile Tenter Dryer	30	4	23	4	26
Unit Heater	30 or 60 [2]	3	20	1	13
Number of Units		140		44	

[1] The Rule 1147 NOx limit is based on a reference level of 3% oxygen (O_2) in the exhaust. All emission test results are converted to a concentration in parts per million at the reference level of 3% O_2.
[2] The emission limit depends upon the process temperature.

The results from the Rule 1147 emission testing program indicate that rule compliant technology is available for ovens and dryers from many sources. In addition, all of the types of ovens and dryers under permit in the SCAQMD can comply with the Rule 1147 NOx limit. However, there is a lower limit on the availability of low NOx burners for ovens and dryers. The smallest low NOx burners available are rated 0.4 and 0.5 mmBtu/hour (400,000 and 500,000 Btu/hour). Burners in this size are available from a number of manufacturers including Eclipse, Maxon, MidCo and PowerFlame. For lower firing rates, oven manufacturers will use this size of burner but limit the firing rate to less than the burner's maximum capacity. If these burners must regularly operate at less than 30% of the maximum firing rate, it may be difficult to comply with the NOx emission limit. Because there is a lower limit on the size of compliant burners for ovens and dryers, staff is considering an exemption from the Rule 1147 NOx emission limit for units with heat input capacities less than 325,000 Btu/hour.

Appendix N – Food Ovens

FOOD OVENS

Food ovens in use at the time SCAQMD Rule 1153.1 was adopted are no longer subject to Rule 1147. However, new food ovens are currently subject to Rule 1147 requirements. Staff are currently evaluating alternative rule development options for exempting new food ovens from Rule 1147. Although new food ovens may be exempt from Rule 1147 in the future, some operators of food ovens have reported results under the rule's emission testing program. At the time of this report, 13 food ovens used for a variety of baking and cooking operations have completed testing under the Rule 1147 program.

These ovens use burners from many manufacturers including Eclipse, Ensign/Selas, Flynn, Maxon and Weishaupt. Eclipse, Maxon and Weishaupt burners air heating burners are used in both batch and conveyor type convective ovens. Ensign and Flynn provide ribbon burners for heating specific types of conveyor ovens and some small batch ovens. For example, conveyor ovens with moving bands that must be heated in order to cook products on the band such as chips and crackers require ribbon or a similar type of burner. Batch type convective ovens can use a variety of burners and do not require ribbon burners. In addition, there are many conveyor type convective ovens that do not require or use ribbon burners. These convective batch and conveyor ovens use air heating nozzle mix or line burners.

Radiant infrared burners are used in both batch and conveyor ovens. This type of burner is available from many manufacturers including those identified earlier in this discussion. Three bakery ovens using only radiant infrared burners were tested and complied with Rule 1147 and Rule 1153.1 emission limits. This type of burner is used in both batch type and conveyor type ovens. The average NOx emission concentration for these burners is 13 ppm with a range of 6 to 19 ppm. Ovens with radiant infrared burners are exempt from the Rule 1153.1 requirement to perform an emissions test because these burners have NOx emissions significantly less than the emission limits in the rule (40 and 60 ppm NOx).

Four ovens with ribbon burners have been tested through the Rule 1147 emission testing program. Two baking ovens with operating temperatures less than 500 °F both had NOx emission concentrations of 21 ppm at their high or normal fire rate. One had NOx emission concentrations of 26 ppm at low fire. One of the units is used for baking tortillas and the other unit is used for baking breads and snacks. In addition, two griddle ovens used for making English muffins and other products cooked in griddles had emission concentrations of 41 ppm and 45 ppm. Griddle ovens with ribbon burners typically operate at temperatures above 500 °F. Both of these ovens comply with the Rule 1153.1 NOx emission limit of 60 ppm for this process temperature.

Five convection type ovens using nozzle mix air heating burners have been tested and comply with Rule 1147 and 1153.1 NOx emission limits. Two of the ovens are used to cook meat products and three cook breads and snacks. These ovens have average emission concentrations of 25 ppm NOx with a range of 22 ppm to 30 ppm. One of these units has a permit limit of 25 ppm NOx that was established prior to adoption of Rule 1147. This oven has been operating for more than seven years with this permit condition and demonstrates that a 25 ppm NOx emission limit is achieved in practice for convection ovens.

The remaining oven that was tested is used for cooking meat and has two cooking sections. The first section is a charbroiler and the second is a convective heating section using steam and heated air. The heated air in the second section is produced using an Eclipse Air Heat line burner. The NOx emission concentration from all burners for this unit was 33 ppm. This result demonstrates compliance with Rule 1153.1 NOx emission limits of 40 ppm and 60 ppm. However, given the design and purpose of this unit, the first section of this device is exempt from the emission limits of Rules 1147 and Rule 1153.1 because it is a charbroiler. The exemption for charbroiling in both Rules 1147 and 1153.1 was not taken into account when the emission test protocol was prepared for this unit.

The results for the 13 food ovens tested through the Rule 1147 program indicate that every type of food oven and burner comply with Rule 1153.1 NOx emission limits. In addition, convection ovens using air heating burners, ovens with radiant infrared burners and conveyor type food ovens with ribbon burners operating at less than 500 °F also comply with the Rule 1147 NOx emission limit of 30 ppm. Moreover, another conveyor oven with ribbon burners and a process temperature less than 500 °F was tested prior to Rule 1147 adoption and had NOx emissions of less than 30 ppm (Figure B-5, Appendix B).

Currently, there are projects funded by SEMPRA Energy and the California Energy Commission to reduce NOx emissions from ribbon burners used in commercial and residential cooking ovens. The data from the Rule 1147 and Rule 1153.1 emissions testing programs and these technology projects will provide staff with data to determine how Rule 1147 and Rule 1153.1 should be amended in the future to limit NOx emissions from new food ovens.

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APPENDIX B

RULE 1147 TASK FORCE MEETING HELD ON AUGUST 3, 2016

Appendix B, Attachment B-1

Agenda for Rule 1147 Task Force Meeting on August 3, 2016

Agenda

Rule 1147 Task Force Meeting

10:30 a.m., August 3, 2016
Room CC-2
SCAQMD Headquarters, Diamond Bar, CA

- Introductions
- Background
  - Rule 1147 History, Implementation and Associated Activity
  - SCAQMD Commitments Including Technology Assessment
- Summary of SCAQMD's Draft Technology Assessment
- ETS, Inc. Presentation
- Stakeholder Input on Draft Technology Assessment
- Future Activity
- Project Contact

Appendix B, Attachment B-2

Rule 1147 Task Force Meeting Presentation by SCAQMD Staff

Rule 1147 Task Force Meeting

August 3, 2016
10:30 AM
Conference Room CC-2
SCAQMD Headquarters, Diamond Bar, CA

Rule 1147 History

- Rule 1147 adopted December 2008 with a 10 year implementation schedule for existing equipment starting July 1, 2010
  - Units with NOx emissions > 1 pound/day phased in from July 1, 2010 to 2014 starting with equipment 25 years and older
  - Units with NOx emission ≤ 1 pound/day phased in 5 years later from July 1, 2015 to 2019 starting with equipment 30 years or older
- September 2010 amendment delayed compliance for the first two years of each category and removed requirement for timing or gas meter
  - Units with NOx emissions > 1 pound/day phased in from July 1, 2012 to 2014 starting with equipment 25 years and older
  - Units with NOx emission ≤ 1 pound/day phased in 5 years later (July 1, 2017 to 2019)
  - Included a requirement for a Technology Assessment of small and low use sources with NOx emissions ≤ 1 pound/day
- Amendment of Rules 219 & 222 for Construction & Portable Equipment
- Adoption of Rule 1153.1 for Food Ovens

Purpose

- Introduce the Contractor Reviewing the SCAQMD Technology Assessment -- ETS, Inc.
- Receive Input from Stakeholders on SCAQMD's Draft Technology Assessment
- Discuss Future Activities and Schedule

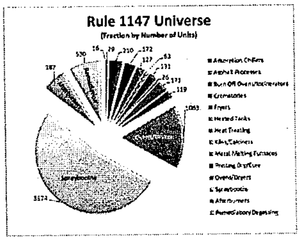
Commitments from September 2010 Rule Amendment

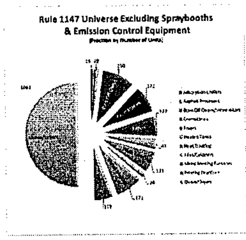
- September 2010 Rule Amendment Includes a Requirement to Perform a Technology Assessment of Small and Low Emission Sources (≤ 1 pound/day NOx)
- Board Resolution to Fund Technology Development if Low NOx Burners Not Available for Small Sources
- EO Commitment to 3rd Party Review of SCAQMD's Technology Assessment

Background

SCAQMD's Draft Technology Assessment

Types of Equipment Evaluated





Future Activities and Schedule

SCAQMD Technology Assessment Findings

- Technical Feasibility
  - The smallest low NOx burners available for low temperature sources are 400,000 to 500,000 Btu/hour
  - Retrofitting heated process tanks that do not comply with the NOx limit requires replacement of the whole system
  - A 30 ppm emission limit for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators is not possible with the available burners
- Cost Effectiveness
  - Replacing heating systems on existing in-use spray booths to meet the NOx emission limit may result in a cost effectiveness higher than SCAQMD criteria used for minor sources
  - Retrofitting units with daily emissions of 1 pound/day or less to meet the NOx limit may result in a cost effectiveness higher than SCAQMD criteria used for minor sources

Future Activities and Schedule

- Summarize ETS Findings and Recommendations
- Revise Draft Technology Assessment, if Needed
- Report to SSC – October 2016
- Initiate Rule Development – October 2016
- Rule Amendment – Spring 2017

Presentation and Discussion with ETS, Inc.

Rule 1147 Contact

Wayne Barcikowski

wbarcikowski@aqmd.gov

909-396-3077

SCAQMD
21865 Copley Dr.
Diamond Bar, CA 91765

Appendix B, Attachment B-3

Rule 1147 Task Force Meeting Presentation by ETS, Inc.

Rule 1147 Task Force Meeting

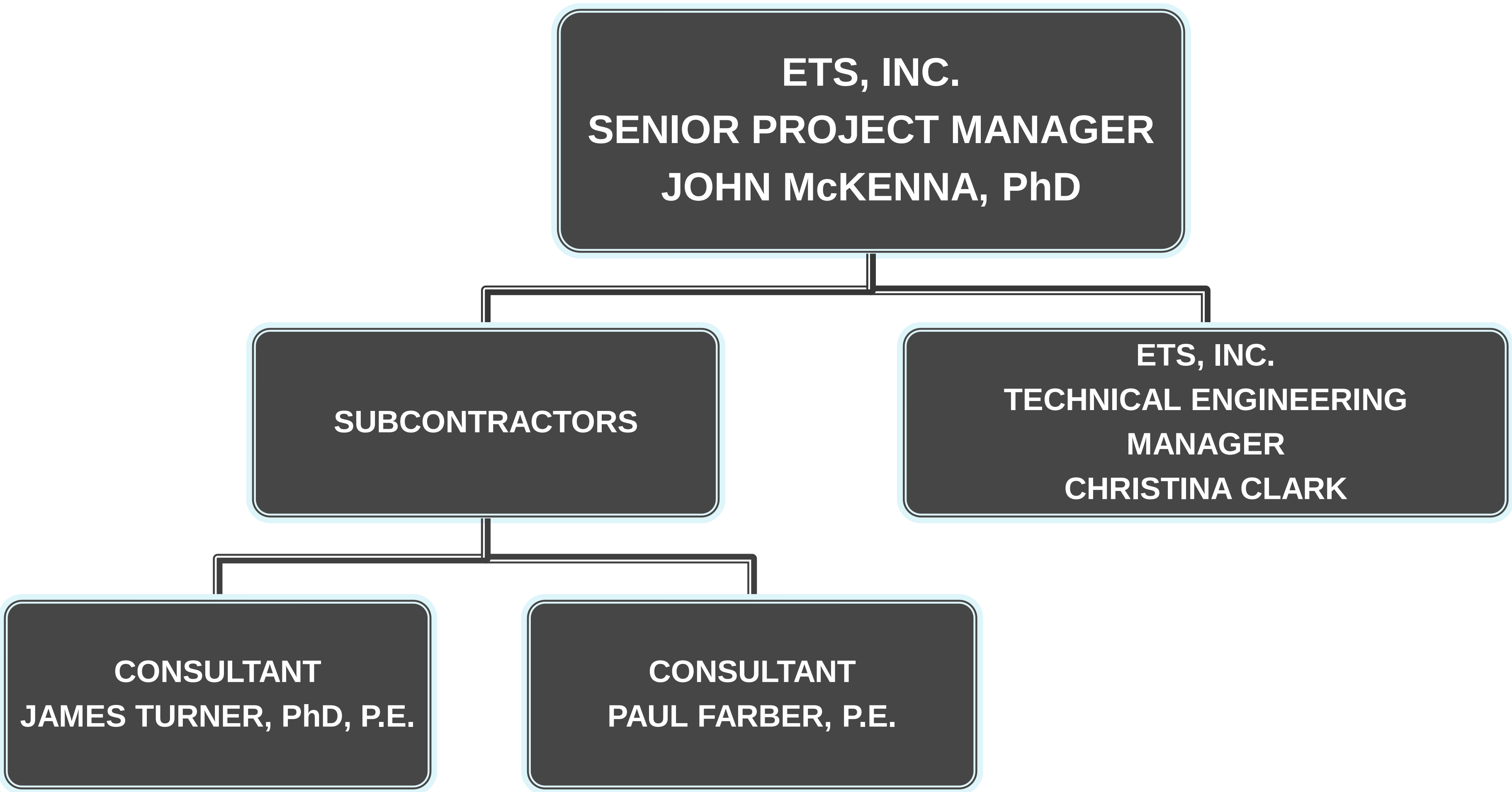
Independent Third Party Review of Draft Rule 1147 Technology Assessment for Small and Low Emission Sources

By ETS, Inc.

August 3, 2016

SCAQMD Headquarters

Project Organization Chart



Information Reviewed by ETS to Date

- SCAQMD *Rule 1147 – NOx Reductions from Miscellaneous Sources* (September 2011)
- SCAQMD *Draft Technology Assessment for Rule 1147 Small and Low Emission Sources* (February 2016)
- SCAQMD *Best Available Control Technology Guidelines (May 2016 Draft)*

Information Reviewed by ETS to Date

- Confidential Information Received:
  - SCAQMD Source Test Databases as of January 2015
  - Summary of Low and High Temp Burner Costs
  - Spray Booth Costs
  - Immersion Tube Heating and Metal Melt Furnace Calculations
  - Contacts for Low NOx Burner Manufacturers

Assumptions Made by ETS in Review

- Annual average NOx emissions by equipment category utilized in cost effectiveness calculations are representative
- Cost effectiveness calculations in the Draft Technology Assessment include total capital investment costs (i.e., price of the equipment, cost for shipping, engineering and installation) per burner
  - Total annual costs are assumed to be not applicable
  - Routine maintenance & equipment costs unrelated to control equipment excluded
  - Compliance demonstration costs are excluded
  - Costs due to compliance with other rules are excluded

Stakeholder Input on Rule 1147 Changes Under Consideration (1)

Exempt sources with total rated heat input less than 325,000 Btu/hour from the Rule 1147 NOx emission limit

- There are no burners in this size range for ovens and dryers that are designed to meet BACT and Rule 1147 emission limits
- The smallest low NOx air heating burners designed to comply with the 30 ppm NOx limit are 400,000 to 500,000 Btu/hour
- If this size burner is set up to operate at < 325,000 Btu/hour and used in oven that requires burner to frequently operate at heat inputs < 30% of capacity, then burner not likely to comply with 30 ppm emission limit
- Burners available in this size range for high temp. equipment; however, these applications (heat treating furnaces & kilns) typically use multiple small burners, total heat ratings > 325,000 Btu/hour, and must comply with emission limit of 60 ppm
- Change would affect unknown # of small units regulated by Rule 1147

Stakeholder Input on Rule 1147 Changes Under Consideration (2)

Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until such time the combustion system or tank is modified, replaced or relocated

- New units would be required to meet the emission limit unless the total unit heat rating is less than or equal to 325,000 Btu/hour
- Source test information on three of the four available types of heating systems for these heated process tanks can comply with the emission limits; however, if a unit does not comply with the emission limit, the entire process tank must be replaced
- Staff estimates this change would affect less than 50 units subject to the Rule 1147 NOx emission limit

Stakeholder Input on Rule 1147 Changes Under Consideration (3)

Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of multi-chamber incinerators, burn-off ovens, burn-out furnaces and incinerators that operate below 800°F

- This new limit will be the same compliance limit required for higher temperatures
- The burner needed for the primary chamber of these devices is not designed to achieve 30 ppm
- This change would affect a small unknown number of units

Stakeholder Input on Rule 1147 Changes Under Consideration (4)

Delay compliance with the NOx emission limit for existing in-use spray booths until the heating system is modified, relocated

- Modified, relocated and new spray booths & prep stations would be required to meet emission limit at time of modification or installation unless the total unit heat rating is ≤ 325,000 Btu/hour; however, Staff is considering to evaluate existing in-use operations with multiple booths and locations separately from smaller operations with one location and single booths and prep stations.
- Cost effectiveness for a new unit that meets Rule 1147 NOx emission limit is at most $22,000 per ton. The cost effectiveness for retrofitting an existing unit can be as high as $88,000 per ton.
- Change will affect > 50% of units now subject to Rule 1147 emission limits
- Will result in delays in emission reductions of 0.3 to 0.4 tons/day starting July 1, 2017. These emission reductions forgone will be reduced as new units replace old units.

Stakeholder Input on Rule 1147 Changes Under Consideration (5)

Delay compliance with NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified, relocated or replaced

- Staff considering to further evaluate operations with multiple small units whose emissions are significant. Unit emissions can be documented using gas or time meters and daily recordkeeping.
- Cost effectiveness for retrofitting low emission units varies considerably and can be significantly higher than the SCAQMD BACT Guidelines average cost effectiveness criteria for equipment for which BACT has not been defined.
- Change will affect at least one quarter of in-use units subject to Rule 1147 emission limit
- Will result in delays of emission reductions of about 0.3 to 0.5 tons/day starting on July 1, 2017. These forgone reductions will decrease as new units replace old units.

Stakeholder Input on Rule 1147 Changes

THANK YOU FOR THE INPUTS

Appendix B, Attachment B-4

Rule 1147 Task Force Meeting Sign-in Sheet

R. 1147 Task Force

Wednesday August 3, 2016– 10:30 AM (PT)

SCAQMD Headquarters | 21865 East Copley Drive, Diamond Bar, CA 91765 | Conference Room CC2

South Coast AQMD

PLEASE PRINT LEGIBLY | SIGN-IN SHEETS MAY BE USED TO NOTIFY YOU OF FUTURE RULE RELATED WORKING-GROUPS AND HEARINGS
SIGN-IN SHEETS MAY BECOME PUBLIC RECORD | SIGNING-IN IS VOLUNTARY

Name:	Organization:	Address (including zip code)	Phone Number:	Email:
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Glenn Kasai	AQMD		x 2271	
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PAGE ___ OF ___

Appendix B, Attachment B-5

Business Cards Provided to SCAQMD at Rule 1147 Task Force Meeting

R. 1147 Task Force

Wednesday August 3, 2016– 10:30 AM (PT)

SCAQMD Headquarters | 21865 East Copley Drive, Diamond Bar, CA 91765 | Conference Room CC2

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SIGN-IN SHEETS MAY BECOME PUBLIC RECORD | SIGNING-IN IS VOLUNTARY

South Coast AQMD

Name:	Organization:	Address (including zip code)	Phone Number:	Email:

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Appendix B, Attachment B-6

Business Cards Provided to ETS, Inc. at Rule 1147 Task Force Meeting

FDI

Anthony W. Endres
President

Furnace Dynamics, Inc.

Innovative Consulting And Furnace Designs For Industry

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CALIFORNIA Small Business Alliance
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Combustion & Control Specialists

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Sales Engineer

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APPENDIX C

INFORMATION RECEIVED FROM FURNACE DYNAMICS, INC. AT RULE 1147 TASK FORCE MEETING ON AUGUST 3, 2016

SUMMARY OF INFORMATION RECEIVED FROM FURNACE DYNAMICS, INC. AT RULE 1147 TASK FORCE MEETING

ITEM #	DESCRIPTION OF INFORMATION RECEIVED BY ETS	NAME/TITLE	COMPANY	ADDITIONAL RELEVANT INFORMATION	DATE RECEIVED BY ETS	FOLLOW-UP BY ETS
Information Received at Rule 1147 Task Force Meeting on 08/03/16 at SCAQMD Headquarters:						
1	Letter titled "A discussion on Potential to Emit (PTE)" with no specific addressee and dated 11/19/15	Anthony Endres, President	Furnace Dynamics, Inc.	Includes a series of charts with relationship of daily emissions vs. BTU input vs. hours of operation at a variety of different average firing rates.	08/03/16	ETS response in Section VIII.A of ETS Independent Technical Review Document
2	Letter titled "RE. Items of Concern Technology Assessment" addressed to Joe Cassmassi, Sr. Rules Manager, SCAQMD, dated 02/18/16	Anthony Endres, President	Furnace Dynamics, Inc.	Cursory review of the SCAQMD Rule 1147 Draft Technology Assessment	08/03/16	ETS response in Section VIII.B of ETS Independent Technical Review Document
3	One page sheet titled "SCAQMD Minor Source BACT Cost Effectiveness Calculation" - Type of Project: Smokehouse AB	Anthony Endres, President	Furnace Dynamics, Inc.		08/03/16	ETS response in Section VIII.C of ETS Independent Technical Review Document
4	One page sheet titled "SCAQMD Minor Source BACT Cost Effectiveness Calculation" - Type of Project: Afterburner	Anthony Endres, President	Furnace Dynamics, Inc.		08/03/16	ETS response in Section VIII.D of ETS Independent Technical Review Document

Appendix C, Attachment C-1

Stakeholder Item #1 – Furnace Dynamics, Inc.

Spoke at length, to Anthony Endres

furnace dynamics, inc.
261 Euclid Ave.
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November 19, 2015

A discussion on Potential to Emit (PTE)

Potential to Emit is defined as the maximum amount of emissions that can be generated from a device operating at maximum capacity, 100% all of the time, twenty-four hours per day, seven days a week. On an annualized basis that number would be multiplied by 365 days per year. Whereas this is a relatively simplistic approach to determining emissions, it actually is impossible for devices to operate under these conditions. They can only operate under these conditions for relative short intervals when the equipment is first fired. The reason has to do with the fact that all of the devices in Rule 1147 are based on a defined operating temperature. This is true from forging, heat treating, metal melting, powder coating, crematories, cooking ovens, etc.

For example, I have designed combustion systems for over 120 furnaces in forging, heat treating and metal melting. Categorically, no device design is based on PTE. They are based on the objective for the process; the production throughput, operating temperatures, refractory losses, etc. It boils down to the net available heat to do work in the furnace or oven, after combustion losses balanced with the production of a given product.

On direct fired forge furnaces, the typical operating temperature range can be anywhere from 800F to as high as 2250°F and they can be in the same furnace. The theoretical flame temperature under optimal air fuel ratio conditions is between 3000°F and 3100°F. To put this into perspective, carbon steel in a molten state is cast at temperatures around 2900°F to 3050°F. Thus if operated in a typical high temperature furnace you could melt metal. Since the operating temperatures are dramatically less, the firing rate overall is consequently less. Since different alloys require tight control on operating temperatures, the heat input must be precisely maintained to not metallurgical destroy the parts contained in the furnaces. For instance, titanium is finish forged at 1750°F. If the temperature goes to 1825°F, the parts are scrap. It can thus be seen that it is impossible to operate at PTE without destroying parts. This goes for any operating range.

This is true regardless of the process albeit, in the metals industry, powder coating, burn off and a plethora of other processes covered in Rule 1147. They all provide heat input to match a specific set point temperature that are required to maintain the product quality necessary to satisfy customer needs. When looking at powder coating, the low NOx burners provide an operating temperature of between 300°F and 650°F, particular powder materials require tight temperature control. If that temperature is exceeded, the powder will be burnt, rendering the parts unusable. Due to the nature of oven burners and the necessity to achieve 30 ppm, the burners typically operate at higher amounts of excess air than high temperature operations. Even

so, the actual flame temperatures can reach over 2000°F. Again, the PTE value would be incorrect to apply as a determinate consideration of emissions and thus pound per day emission profiles.

Actual Annual Use vs. PTE: To make the determination of actual vs. PTE, we acquired So. Cal Gas Company annual use in therms, converted them to millions of cubic feet, then got to total BTU/hr maximum input of each device in the plant and correlated the actual MMcf to the potential if operated at the maximum input, 24 hours per day on an annual basis. I conducted a study to determine the correlation of PTE to actual usage on two forge plants, one very large and a medium small shop. By the above method, the large forge facility was operating at a 25% of PTE. On the smaller facility there were gas consumption limits on all of their furnaces. The actuals were 19.6% of the permit limits which was well below the devices PTE. This facility was evaluated for actual annual vs. PTE and the results showed 10.82%. I have just completed an evaluation of a couple of powder coating companies. One had an actual annual, compared to PTE of 12%. Another powder coat facility showed a six-year average of 10.49%. during the six years the annual averages ranged from 9.16% to 11.99%. It is important to understand that these facilities were operating under normal production capabilities. Some companies are single shift, others are two shift and one is a three shift operation 5 days per week. I will be conducting additional analysis on a number of other facilities and forwarding those values to staff. However, I would believe the Actual compared to PTE is going to be in the 10% - 25% range.

Included Charts: I have included a series of charts that can provide a level of understanding of the relationship of daily emissions vs. BTU input vs. hours of operation at a variety of different average firing rates. The first charts are related to the SCAQMD default emission factor of 130#/MMcf natural gas or 101.4 ppm. The first chart shows the correlation of values assuming 100% of the capacity of the combustion system or PTE. The next three charts show the same correlations of firing rate to hours of operation at 50% of PTE and 20% of PTE. The fourth chart shows how high the BTU rating could be per hour of operation and still stay under 1#/day of NOx. The last three charts show the same data but based on a lower emission value of 60 ppm.

It can be seen the lower emission values reflect a substantially lower pound per day emission value. This is for illustrative value only. However, it should be understood that few devices operate anywhere near the default ppm values. In the last 3 years I have conducted approximately 175 pretests (mostly on 1147 devices) using a Testo 350 combustion analyzer. I have also parallel tested about 70 official source tests and my readings are typically less than 2 ppm deviation from the official source test results. I have yet to see any device that operated near the 101.4 ppm level. The lower temperature devices such as ovens are even lower relative to the default emission factor. Thus even with the values shown on the first 4 charts, the pound per day values are overstated.

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I believe a collaborative effort on behalf of District staff and industry representatives can arrive at a reasonable means of determining what constitutes one pound per day usage. Perhaps the simplest approach could be the use of non-resettable timers on devices, with a limit of X hours per day for a given BTU input. Obviously this would have to be backed up with logs of hours of operation that could be verified by an inspector. If, as was suggested in the 1147 Task Force Meeting, an exemption (or an extended compliance date) be given to devices operating at less than a pound per day, verification is essential. There could be other means of quantification of daily emissions – these need to be discussed in a meaningful way to determine what works for the District and industry.

As always, we appreciate the opportunity to work with staff to assist in developing a bridge of understanding of how industry actually operates. Should you have any questions regarding this subject, please feel free to engage me in a meaningful dialogue to assist in developing rules that relate to real-world conditions.

Sincerely,

Anthony Endres
President

Determination of <1#/day NOx Emissions At Maximum Firing Rate

Average Input: 100%

ppm NOx: 101.4

	Maximum BTU Input													
Hours Per Day	**200,000**	**250,000**	**300,000**	**350,000**	**400,000**	**450,000**	**500,000**	**550,000**	**600,000**	**800,000**	**900,000**	**1,000,000**	**1,500,000**	**2,000,000**
1	0.025	0.031	0.037	0.043	0.050	0.056	0.062	0.068	0.074	0.099	0.111	0.124	0.186	0.248
2	0.050	0.062	0.074	0.087	0.099	0.111	0.124	0.136	0.149	0.198	0.223	0.248	0.371	0.495
3	0.074	0.093	0.111	0.130	0.149	0.167	0.186	0.204	0.223	0.297	0.334	0.371	0.557	0.743
4	0.099	0.124	0.149	0.173	0.198	0.223	0.248	0.272	0.297	0.396	0.446	0.495	0.743	0.990
5	0.124	0.155	0.186	0.217	0.248	0.279	0.310	0.340	0.371	0.495	0.557	0.619	0.929	1.238
6	0.149	0.186	0.223	0.260	0.297	0.334	0.371	0.409	0.446	0.594	0.669	0.743	1.114	1.486
7	0.173	0.217	0.260	0.303	0.347	0.390	0.433	0.477	0.520	0.693	0.780	0.867	1.300	1.733
8	0.198	0.248	0.297	0.347	0.396	0.446	0.495	0.545	0.594	0.792	0.891	0.990	1.486	1.981
9	0.223	0.279	0.334	0.390	0.446	0.501	0.557	0.613	0.669	0.891	1.003	1.114	1.671	2.229
10	0.248	0.310	0.371	0.433	0.495	0.557	0.619	0.681	0.743	0.990	1.114	1.238	1.857	2.476
11	0.272	0.340	0.409	0.477	0.545	0.613	0.681	0.749	0.817	1.090	1.226	1.362	2.043	2.724
12	0.297	0.371	0.446	0.520	0.594	0.669	0.743	0.817	0.891	1.189	1.337	1.486	2.229	2.971
13	0.322	0.402	0.483	0.563	0.644	0.724	0.805	0.885	0.966	1.288	1.449	1.610	2.414	3.219
14	0.347	0.433	0.520	0.607	0.693	0.780	0.867	0.953	1.040	1.387	1.560	1.733	2.600	3.467
15	0.371	0.464	0.557	0.650	0.743	0.836	0.929	1.021	1.114	1.486	1.671	1.857	2.786	3.714
16	0.396	0.495	0.594	0.693	0.792	0.891	0.990	1.090	1.189	1.585	1.783	1.981	2.971	3.962
17	0.421	0.526	0.631	0.737	0.842	0.947	1.052	1.158	1.263	1.684	1.894	2.105	3.157	4.210
18	0.446	0.557	0.669	0.780	0.891	1.003	1.114	1.226	1.337	1.783	2.006	2.229	3.343	4.457
19	0.470	0.588	0.706	0.823	0.941	1.059	1.176	1.294	1.411	1.882	2.117	2.352	3.529	4.705
20	0.495	0.619	0.743	0.867	0.990	1.114	1.238	1.362	1.486	1.981	2.229	2.476	3.714	4.952
21	0.520	0.650	0.780	0.910	1.040	1.170	1.300	1.430	1.560	2.080	2.340	2.600	3.900	5.200
22	0.545	0.681	0.817	0.953	1.090	1.226	1.362	1.498	1.634	2.179	2.451	2.724	4.086	5.448
23	0.570	0.712	0.854	0.997	1.139	1.281	1.424	1.566	1.709	2.278	2.563	2.848	4.271	5.695
24	0.594	0.743	0.891	1.040	1.189	1.337	1.486	1.634	1.783	2.377	2.674	2.971	4.457	5.943

Notes:

1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet/1,000,000 x hours of operation

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Determination of <1#/day NOx Emissions At Less Than 100% Firing Rate

Average Input: 50%

ppm NOx: 101.4

	Maximum BTU Input													
Hours Per Day	**200,000**	**250,000**	**300,000**	**350,000**	**400,000**	**450,000**	**500,000**	**550,000**	**600,000**	**800,000**	**900,000**	**1,000,000**	**1,500,000**	**2,000,000**
1	0.012	0.015	0.019	0.022	0.025	0.028	0.031	0.034	0.037	0.050	0.056	0.062	0.093	0.124
2	0.025	0.031	0.037	0.043	0.050	0.056	0.062	0.068	0.074	0.099	0.111	0.124	0.186	0.248
3	0.037	0.046	0.056	0.065	0.074	0.084	0.093	0.102	0.111	0.149	0.167	0.186	0.279	0.371
4	0.050	0.062	0.074	0.087	0.099	0.111	0.124	0.136	0.149	0.198	0.223	0.248	0.371	0.495
5	0.062	0.077	0.093	0.108	0.124	0.139	0.155	0.170	0.186	0.248	0.279	0.310	0.464	0.619
6	0.074	0.093	0.111	0.130	0.149	0.167	0.186	0.204	0.223	0.297	0.334	0.371	0.557	0.743
7	0.087	0.108	0.130	0.152	0.173	0.195	0.217	0.238	0.260	0.347	0.390	0.433	0.650	0.867
8	0.099	0.124	0.149	0.173	0.198	0.223	0.248	0.272	0.297	0.396	0.446	0.495	0.743	0.990
9	0.111	0.139	0.167	0.195	0.223	0.251	0.279	0.306	0.334	0.446	0.501	0.557	0.836	1.114
10	0.124	0.155	0.186	0.217	0.248	0.279	0.310	0.340	0.371	0.495	0.557	0.619	0.929	1.238
11	0.136	0.170	0.204	0.238	0.272	0.306	0.340	0.375	0.409	0.545	0.613	0.681	1.021	1.362
12	0.149	0.186	0.223	0.260	0.297	0.334	0.371	0.409	0.446	0.594	0.669	0.743	1.114	1.486
13	0.161	0.201	0.241	0.282	0.322	0.362	0.402	0.443	0.483	0.644	0.724	0.805	1.207	1.610
14	0.173	0.217	0.260	0.303	0.347	0.390	0.433	0.477	0.520	0.693	0.780	0.867	1.300	1.733
15	0.186	0.232	0.279	0.325	0.371	0.418	0.464	0.511	0.557	0.743	0.836	0.929	1.393	1.857
16	0.198	0.248	0.297	0.347	0.396	0.446	0.495	0.545	0.594	0.792	0.891	0.990	1.486	1.981
17	0.210	0.263	0.316	0.368	0.421	0.474	0.526	0.579	0.631	0.842	0.947	1.052	1.579	2.105
18	0.223	0.279	0.334	0.390	0.446	0.501	0.557	0.613	0.669	0.891	1.003	1.114	1.671	2.229
19	0.235	0.294	0.353	0.412	0.470	0.529	0.588	0.647	0.706	0.941	1.059	1.176	1.764	2.352
20	0.248	0.310	0.371	0.433	0.495	0.557	0.619	0.681	0.743	0.990	1.114	1.238	1.857	2.476
21	0.260	0.325	0.390	0.455	0.520	0.585	0.650	0.715	0.780	1.040	1.170	1.300	1.950	2.600
22	0.272	0.340	0.409	0.477	0.545	0.613	0.681	0.749	0.817	1.090	1.226	1.362	2.043	2.724
23	0.285	0.356	0.427	0.498	0.570	0.641	0.712	0.783	0.854	1.139	1.281	1.424	2.136	2.848
24	0.297	0.371	0.446	0.520	0.594	0.669	0.743	0.817	0.891	1.189	1.337	1.486	2.229	2.971

Notes:

1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet /1,000,000 x hours of operation x percent of maximum firing rate

Prepared by:

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Email: awefdi@gmail.com

Determination of <1#/day NOx Emissions At Less Than 100% Firing Rate

Average Input: 20%

ppm NOx: 101.4

	Maximum BTU Input													
Hours Per Day	**200,000**	**250,000**	**300,000**	**350,000**	**400,000**	**450,000**	**500,000**	**550,000**	**600,000**	**800,000**	**900,000**	**1,000,000**	**1,500,000**	**2,000,000**
1	0.005	0.006	0.007	0.009	0.010	0.011	0.012	0.014	0.015	0.020	0.022	0.025	0.037	0.050
2	0.010	0.012	0.015	0.017	0.020	0.022	0.025	0.027	0.030	0.040	0.045	0.050	0.074	0.099
3	0.015	0.019	0.022	0.026	0.030	0.033	0.037	0.041	0.045	0.059	0.067	0.074	0.111	0.149
4	0.020	0.025	0.030	0.035	0.040	0.045	0.050	0.054	0.059	0.079	0.089	0.099	0.149	0.198
5	0.025	0.031	0.037	0.043	0.050	0.056	0.062	0.068	0.074	0.099	0.111	0.124	0.186	0.248
6	0.030	0.037	0.045	0.052	0.059	0.067	0.074	0.082	0.089	0.119	0.134	0.149	0.223	0.297
7	0.035	0.043	0.052	0.061	0.069	0.078	0.087	0.095	0.104	0.139	0.156	0.173	0.260	0.347
8	0.040	0.050	0.059	0.069	0.079	0.089	0.099	0.109	0.119	0.158	0.178	0.198	0.297	0.396
9	0.045	0.056	0.067	0.078	0.089	0.100	0.111	0.123	0.134	0.178	0.201	0.223	0.334	0.446
10	0.050	0.062	0.074	0.087	0.099	0.111	0.124	0.136	0.149	0.198	0.223	0.248	0.371	0.495
11	0.054	0.068	0.082	0.095	0.109	0.123	0.136	0.150	0.163	0.218	0.245	0.272	0.409	0.545
12	0.059	0.074	0.089	0.104	0.119	0.134	0.149	0.163	0.178	0.238	0.267	0.297	0.446	0.594
13	0.064	0.080	0.097	0.113	0.129	0.145	0.161	0.177	0.193	0.258	0.290	0.322	0.483	0.644
14	0.069	0.087	0.104	0.121	0.139	0.156	0.173	0.191	0.208	0.277	0.312	0.347	0.520	0.693
15	0.074	0.093	0.111	0.130	0.149	0.167	0.186	0.204	0.223	0.297	0.334	0.371	0.557	0.743
16	0.079	0.099	0.119	0.139	0.158	0.178	0.198	0.218	0.238	0.317	0.357	0.396	0.594	0.792
17	0.084	0.105	0.126	0.147	0.168	0.189	0.210	0.232	0.253	0.337	0.379	0.421	0.631	0.842
18	0.089	0.111	0.134	0.156	0.178	0.201	0.223	0.245	0.267	0.357	0.401	0.446	0.669	0.891
19	0.094	0.118	0.141	0.165	0.188	0.212	0.235	0.259	0.282	0.376	0.423	0.470	0.706	0.941
20	0.099	0.124	0.149	0.173	0.198	0.223	0.248	0.272	0.297	0.396	0.446	0.495	0.743	0.990
21	0.104	0.130	0.156	0.182	0.208	0.234	0.260	0.286	0.312	0.416	0.468	0.520	0.780	1.040
22	0.109	0.136	0.163	0.191	0.218	0.245	0.272	0.300	0.327	0.436	0.490	0.545	0.817	1.090
23	0.114	0.142	0.171	0.199	0.228	0.256	0.285	0.313	0.342	0.456	0.513	0.570	0.854	1.139
24	0.119	0.149	0.178	0.208	0.238	0.267	0.297	0.327	0.357	0.475	0.535	0.594	0.891	1.189

Notes:
1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet/1000000 x hours of operation x percent of maximum firing rate

Prepared by:
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Determination of <1#/day NOx Emissions At Less Than 100% Firing Rate

Average Input: 20%

ppm NOx: 101.4

	Maximum BTU Input													
Hours Per Day	**1,000,000**	**1,200,000**	**1,400,000**	**1,600,000**	**1,800,000**	**2,000,000**	**2,200,000**	**2,400,000**	**2,600,000**	**2,800,000**	**3,000,000**	**3,200,000**	**3,400,000**	**3,600,000**
1	0.025	0.030	0.035	0.040	0.045	0.050	0.054	0.059	0.064	0.069	0.074	0.079	0.084	0.089
2	0.050	0.059	0.069	0.079	0.089	0.099	0.109	0.119	0.129	0.139	0.149	0.158	0.168	0.178
3	0.074	0.089	0.104	0.119	0.134	0.149	0.163	0.178	0.193	0.208	0.223	0.238	0.253	0.267
4	0.099	0.119	0.139	0.158	0.178	0.198	0.218	0.238	0.258	0.277	0.297	0.317	0.337	0.357
5	0.124	0.149	0.173	0.198	0.223	0.248	0.272	0.297	0.322	0.347	0.371	0.396	0.421	0.446
6	0.149	0.178	0.208	0.238	0.267	0.297	0.327	0.357	0.386	0.416	0.446	0.475	0.505	0.535
7	0.173	0.208	0.243	0.277	0.312	0.347	0.381	0.416	0.451	0.485	0.520	0.555	0.589	0.624
8	0.198	0.238	0.277	0.317	0.357	0.396	0.436	0.475	0.515	0.555	0.594	0.634	0.674	0.713
9	0.223	0.267	0.312	0.357	0.401	0.446	0.490	0.535	0.579	0.624	0.669	0.713	0.758	0.802
10	0.248	0.297	0.347	0.396	0.446	0.495	0.545	0.594	0.644	0.693	0.743	0.792	0.842	0.891
11	0.272	0.327	0.381	0.436	0.490	0.545	0.599	0.654	0.708	0.763	0.817	0.872	0.926	0.981
12	0.297	0.357	0.416	0.475	0.535	0.594	0.654	0.713	0.773	0.832	0.891	0.951	1.010	1.070
13	0.322	0.386	0.451	0.515	0.579	0.644	0.708	0.773	0.837	0.901	0.966	1.030	1.094	1.159
14	0.347	0.416	0.485	0.555	0.624	0.693	0.763	0.832	0.901	0.971	1.040	1.109	1.179	1.248
15	0.371	0.446	0.520	0.594	0.669	0.743	0.817	0.891	0.966	1.040	1.114	1.189	1.263	1.337
16	0.396	0.475	0.555	0.634	0.713	0.792	0.872	0.951	1.030	1.109	1.189	1.268	1.347	1.426
17	0.421	0.505	0.589	0.674	0.758	0.842	0.926	1.010	1.094	1.179	1.263	1.347	1.431	1.515
18	0.446	0.535	0.624	0.713	0.802	0.891	0.981	1.070	1.159	1.248	1.337	1.426	1.515	1.605
19	0.470	0.565	0.659	0.753	0.847	0.941	1.035	1.129	1.223	1.317	1.411	1.506	1.600	1.694
20	0.495	0.594	0.693	0.792	0.891	0.990	1.090	1.189	1.288	1.387	1.486	1.585	1.684	1.783
21	0.520	0.624	0.728	0.832	0.936	1.040	1.144	1.248	1.352	1.456	1.560	1.664	1.768	1.872
22	0.545	0.654	0.763	0.872	0.981	1.090	1.198	1.307	1.416	1.525	1.634	1.743	1.852	1.961
23	0.570	0.683	0.797	0.911	1.025	1.139	1.253	1.367	1.481	1.595	1.709	1.822	1.936	2.050
24	0.594	0.713	0.832	0.951	1.070	1.189	1.307	1.426	1.545	1.664	1.783	1.902	2.021	2.139

Notes:

1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet/1000000 x hours of operation x percent of maximum firing rate

Prepared by:

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Determination of <1#/day NOx Emissions At Maximum Firing Rate

Average Input: 100%

NOx ppm: 60

	Maximum BTU Input													
Hours Per Day	**200,000**	**250,000**	**300,000**	**350,000**	**400,000**	**450,000**	**500,000**	**550,000**	**600,000**	**800,000**	**900,000**	**1,000,000**	**1,500,000**	**2,000,000**
1	0.011	0.014	0.017	0.020	0.023	0.026	0.029	0.031	0.034	0.046	0.051	0.057	0.086	0.114
2	0.023	0.029	0.034	0.040	0.046	0.051	0.057	0.063	0.069	0.091	0.103	0.114	0.171	0.229
3	0.034	0.043	0.051	0.060	0.069	0.077	0.086	0.094	0.103	0.137	0.154	0.171	0.257	0.343
4	0.046	0.057	0.069	0.080	0.091	0.103	0.114	0.126	0.137	0.183	0.206	0.229	0.343	0.457
5	0.057	0.071	0.086	0.100	0.114	0.129	0.143	0.157	0.171	0.229	0.257	0.286	0.429	0.571
6	0.069	0.086	0.103	0.120	0.137	0.154	0.171	0.189	0.206	0.274	0.309	0.343	0.514	0.686
7	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.220	0.240	0.320	0.360	0.400	0.600	0.800
8	0.091	0.114	0.137	0.160	0.183	0.206	0.229	0.251	0.274	0.366	0.411	0.457	0.686	0.914
9	0.103	0.129	0.154	0.180	0.206	0.231	0.257	0.283	0.309	0.411	0.463	0.514	0.771	1.029
10	0.114	0.143	0.171	0.200	0.229	0.257	0.286	0.314	0.343	0.457	0.514	0.571	0.857	1.143
11	0.126	0.157	0.189	0.220	0.251	0.283	0.314	0.346	0.377	0.503	0.566	0.629	0.943	1.257
12	0.137	0.171	0.206	0.240	0.274	0.309	0.343	0.377	0.411	0.549	0.617	0.686	1.029	1.371
13	0.149	0.186	0.223	0.260	0.297	0.334	0.371	0.409	0.446	0.594	0.669	0.743	1.114	1.486
14	0.160	0.200	0.240	0.280	0.320	0.360	0.400	0.440	0.480	0.640	0.720	0.800	1.200	1.600
15	0.171	0.214	0.257	0.300	0.343	0.386	0.429	0.471	0.514	0.686	0.771	0.857	1.286	1.714
16	0.183	0.229	0.274	0.320	0.366	0.411	0.457	0.503	0.549	0.731	0.823	0.914	1.371	1.829
17	0.194	0.243	0.291	0.340	0.389	0.437	0.486	0.534	0.583	0.777	0.874	0.971	1.457	1.943
18	0.206	0.257	0.309	0.360	0.411	0.463	0.514	0.566	0.617	0.823	0.926	1.029	1.543	2.057
19	0.217	0.271	0.326	0.380	0.434	0.489	0.543	0.597	0.651	0.869	0.977	1.086	1.629	2.171
20	0.229	0.286	0.343	0.400	0.457	0.514	0.571	0.629	0.686	0.914	1.029	1.143	1.714	2.286
21	0.240	0.300	0.360	0.420	0.480	0.540	0.600	0.660	0.720	0.960	1.080	1.200	1.800	2.400
22	0.251	0.314	0.377	0.440	0.503	0.566	0.629	0.691	0.754	1.006	1.131	1.257	1.886	2.514
23	0.263	0.329	0.394	0.460	0.526	0.591	0.657	0.723	0.789	1.051	1.183	1.314	1.971	2.629
24	0.274	0.343	0.411	0.480	0.549	0.617	0.686	0.754	0.823	1.097	1.234	1.371	2.057	2.743

Notes:

1. BTU/CF = 1050
2. Emissions are based on the "NOx ppm ___" value.
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet/1,000,000 x hours of operation

Prepared by:

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Determination of <1#/day NOx Emissions At Less Than 100% Firing Rate

Average Input: 50%

NOx ppm: 60

	Maximum BTU Input													
Hours Per Day	200,000	250,000	300,000	350,000	400,000	450,000	500,000	550,000	600,000	800,000	900,000	1,000,000	1,500,000	2,000,000
1	0.006	0.007	0.009	0.010	0.011	0.013	0.014	0.016	0.017	0.023	0.026	0.029	0.043	0.057
2	0.011	0.014	0.017	0.020	0.023	0.026	0.029	0.031	0.034	0.046	0.051	0.057	0.086	0.114
3	0.017	0.021	0.026	0.030	0.034	0.039	0.043	0.047	0.051	0.069	0.077	0.086	0.129	0.171
4	0.023	0.029	0.034	0.040	0.046	0.051	0.057	0.063	0.069	0.091	0.103	0.114	0.171	0.229
5	0.029	0.036	0.043	0.050	0.057	0.064	0.071	0.079	0.086	0.114	0.129	0.143	0.214	0.286
6	0.034	0.043	0.051	0.060	0.069	0.077	0.086	0.094	0.103	0.137	0.154	0.171	0.257	0.343
7	0.040	0.050	0.060	0.070	0.080	0.090	0.100	0.110	0.120	0.160	0.180	0.200	0.300	0.400
8	0.046	0.057	0.069	0.080	0.091	0.103	0.114	0.126	0.137	0.183	0.206	0.229	0.343	0.457
9	0.051	0.064	0.077	0.090	0.103	0.116	0.129	0.141	0.154	0.206	0.231	0.257	0.386	0.514
10	0.057	0.071	0.086	0.100	0.114	0.129	0.143	0.157	0.171	0.229	0.257	0.286	0.429	0.571
11	0.063	0.079	0.094	0.110	0.126	0.141	0.157	0.173	0.189	0.251	0.283	0.314	0.471	0.629
12	0.069	0.086	0.103	0.120	0.137	0.154	0.171	0.189	0.206	0.274	0.309	0.343	0.514	0.686
13	0.074	0.093	0.111	0.130	0.149	0.167	0.186	0.204	0.223	0.297	0.334	0.371	0.557	0.743
14	0.080	0.100	0.120	0.140	0.160	0.180	0.200	0.220	0.240	0.320	0.360	0.400	0.600	0.800
15	0.086	0.107	0.129	0.150	0.171	0.193	0.214	0.236	0.257	0.343	0.386	0.429	0.643	0.857
16	0.091	0.114	0.137	0.160	0.183	0.206	0.229	0.251	0.274	0.366	0.411	0.457	0.686	0.914
17	0.097	0.121	0.146	0.170	0.194	0.219	0.243	0.267	0.291	0.389	0.437	0.486	0.729	0.971
18	0.103	0.129	0.154	0.180	0.206	0.231	0.257	0.283	0.309	0.411	0.463	0.514	0.771	1.029
19	0.109	0.136	0.163	0.190	0.217	0.244	0.271	0.299	0.326	0.434	0.489	0.543	0.814	1.086
20	0.114	0.143	0.171	0.200	0.229	0.257	0.286	0.314	0.343	0.457	0.514	0.571	0.857	1.143
21	0.120	0.150	0.180	0.210	0.240	0.270	0.300	0.330	0.360	0.480	0.540	0.600	0.900	1.200
22	0.126	0.157	0.189	0.220	0.251	0.283	0.314	0.346	0.377	0.503	0.566	0.629	0.943	1.257
23	0.131	0.164	0.197	0.230	0.263	0.296	0.329	0.361	0.394	0.526	0.591	0.657	0.986	1.314
24	0.137	0.171	0.206	0.240	0.274	0.309	0.343	0.377	0.411	0.549	0.617	0.686	1.029	1.371

Notes:

1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet /1,000,000 x hours of operation x percent of maximum firing rate

Prepared by:

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Determination of <1#/day NOx Emissions At Less Than 100% Firing Rate

Average Input: 20% **NOx ppm: 60**

	Maximum BTU Input													
Hours Per Day	**200,000**	**250,000**	**300,000**	**350,000**	**400,000**	**450,000**	**500,000**	**550,000**	**600,000**	**800,000**	**900,000**	**1,000,000**	**1,500,000**	**2,000,000**
1	0.002	0.003	0.003	0.004	0.005	0.005	0.006	0.006	0.007	0.009	0.010	0.011	0.017	0.023
2	0.005	0.006	0.007	0.008	0.009	0.010	0.011	0.013	0.014	0.018	0.021	0.023	0.034	0.046
3	0.007	0.009	0.010	0.012	0.014	0.015	0.017	0.019	0.021	0.027	0.031	0.034	0.051	0.069
4	0.009	0.011	0.014	0.016	0.018	0.021	0.023	0.025	0.027	0.037	0.041	0.046	0.069	0.091
5	0.011	0.014	0.017	0.020	0.023	0.026	0.029	0.031	0.034	0.046	0.051	0.057	0.086	0.114
6	0.014	0.017	0.021	0.024	0.027	0.031	0.034	0.038	0.041	0.055	0.062	0.069	0.103	0.137
7	0.016	0.020	0.024	0.028	0.032	0.036	0.040	0.044	0.048	0.064	0.072	0.080	0.120	0.160
8	0.018	0.023	0.027	0.032	0.037	0.041	0.046	0.050	0.055	0.073	0.082	0.091	0.137	0.183
9	0.021	0.026	0.031	0.036	0.041	0.046	0.051	0.057	0.062	0.082	0.093	0.103	0.154	0.206
10	0.023	0.029	0.034	0.040	0.046	0.051	0.057	0.063	0.069	0.091	0.103	0.114	0.171	0.229
11	0.025	0.031	0.038	0.044	0.050	0.057	0.063	0.069	0.075	0.101	0.113	0.126	0.189	0.251
12	0.027	0.034	0.041	0.048	0.055	0.062	0.069	0.075	0.082	0.110	0.123	0.137	0.206	0.274
13	0.030	0.037	0.045	0.052	0.059	0.067	0.074	0.082	0.089	0.119	0.134	0.149	0.223	0.297
14	0.032	0.040	0.048	0.056	0.064	0.072	0.080	0.088	0.096	0.128	0.144	0.160	0.240	0.320
15	0.034	0.043	0.051	0.060	0.069	0.077	0.086	0.094	0.103	0.137	0.154	0.171	0.257	0.343
16	0.037	0.046	0.055	0.064	0.073	0.082	0.091	0.101	0.110	0.146	0.165	0.183	0.274	0.366
17	0.039	0.049	0.058	0.068	0.078	0.087	0.097	0.107	0.117	0.155	0.175	0.194	0.291	0.389
18	0.041	0.051	0.062	0.072	0.082	0.093	0.103	0.113	0.123	0.165	0.185	0.206	0.309	0.411
19	0.043	0.054	0.065	0.076	0.087	0.098	0.109	0.119	0.130	0.174	0.195	0.217	0.326	0.434
20	0.046	0.057	0.069	0.080	0.091	0.103	0.114	0.126	0.137	0.183	0.206	0.229	0.343	0.457
21	0.048	0.060	0.072	0.084	0.096	0.108	0.120	0.132	0.144	0.192	0.216	0.240	0.360	0.480
22	0.050	0.063	0.075	0.088	0.101	0.113	0.126	0.138	0.151	0.201	0.226	0.251	0.377	0.503
23	0.053	0.066	0.079	0.092	0.105	0.118	0.131	0.145	0.158	0.210	0.237	0.263	0.394	0.526
24	0.055	0.069	0.082	0.096	0.110	0.123	0.137	0.151	0.165	0.219	0.247	0.274	0.411	0.549

Notes:

1. BTU/CF = 1050
2. Emissions are based on the SCAQMD default value of 130#/MMCF or 101.4 ppm
3. All emissions are pound per day based on the hours per day operated.
4. Shaded areas indicate the operational values that exceed one pound per day
5. Formula is (BTU/1050) x pounds per million cubic feet/1000000 x hours of operation x percent of maximum firing rate

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Appendix C, Attachment C-2

Stakeholder Item #2 – Furnace Dynamics, Inc.

FDI

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261 Euclid Ave.
Long Beach, CA 90803
562-433-3025

February 18, 2016

Mr. Joe Cassmassi
Sr. Rules Manager
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765

RE. Items of Concern Technology Assessment

Dear Joe,

I have conducted a cursory review of the Draft Technology Assessment and have provided some comments below. Whereas, this is a significant document, more analysis is necessary. I believe this is a start toward a more complete review.

Enforcement Considerations:

1. Between July 2010 and the announcement that Rule 1147 was to be revised, there were a number of NOVs and NCs issued to permit holders. Once the rule revision was announced, all of the notices were rescinded through prosecutorial discretion authorized by the Executive Officer. Since we are at the same crossroads pursuant to the pending rule change and the pending rule change will render many of the existing NOVs null and void, it is requested that these existing NOVs be rescinded until after the final rule changes are made and approved by the Governing Board.
2. Delay any enforcement action until after the rule is modified so the notices will be appropriate to the new rule change.

Cost Effectiveness

1. ***Excluded Costs.*** There was an exclusion of replacement components in burner systems. Whereas, this is may be appropriate for boilers and other types of devices such as radiant tubes, the issue is with burner cans for low NOx recirculation type burners such as the Eclipse Winnox burners. These burners replaced non low NOx burners that did not have issues with burner cans. We

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have found that these burner cans need to be replaced, usually in 3-10 years. Cost of the can is between \$2.5K – \$5K plus installation which can run a couple of thousands. The replacement requires two technicians to remove the burners from the oven, that includes disconnecting the electrical and plumbing from the burner, removing the old burner can, installing the new burner can, re installing the burner on the oven, reconnecting the electrical and plumbing then test firing. Therefore since this is not associated with a normal existing operation it needs to be included in the cost effectiveness considerations relating to maintenance costs.

2. ***Evaluation of cost effectiveness methods***. Staff has indicted that the cost effectiveness was based on the differential between the cost of an existing burner vs. the cost of a new low NOx burner. This is not a valid consideration in that this is a replacement rule and would only apply to the very few cases where the existing burner was scheduled for replacement and not to the general population of equipment covered under 1147.
3. ***Methods of Determining Cost Effectiveness***. The Technology Assessment cites a number of methods for determining the cost effectiveness of the devices contained within the rule structure. We believe this should be simplified so a single cost effective methodology is utilized for all 1147 devices. It is recommended that the 2006 SCAQMD Best Available Control Technology Guidelines, Part C: Policy and Procedures for Non-Major Polluting Facilities shown on Appendix D Attachment 1 – 4 be used.
4. ***Maximum Acceptable Cost Effectiveness***. Since there are a significant number of devices in many different industries, there exists some significant differences in the actual cost effectiveness. Some devices have minimal use compared to other devices within the same category. These should be considered on a case by case basis. Consider that the RECLAIM Program must be reevaluated if the cost effectiveness exceeds \$25,000 per controlled ton. Yet there is no constraint as to the cost effectiveness of devices contained in Rule 1147. These are also small facilities with few clients compared to the large companies in the RECLAIM Program who, in many cases, like utilities have millions of customers and can easily distribute the cost of reduction to a point where the relative impact is inconsequential. We are therefore recommending a fixed maximum cost effectiveness level be established so it would be not disproportionately affect small industries. We would recommend an absolute value of \$30,000/controlled

ton. With the methodology for calculating contained in Appendix D Attachment 1-4.

Burners Mentioned:

1. We have had very good results with Eclipse Winnox burners for low temperature recirculation types of ovens. Another burner mentioned was a Maxon Cyclomax. Winnox burners have all passed source tests. When we pretested a Cyclomax burner, the NOx values at 100% were 25 ppm, as the set point was reached and the burner turned down, the NOx went up to around 95 ppm. The turndown on the burner was about 3:1. Thus, the burner had to be replaced even though the original Cyclomax burner was classified and purchased as a low NOx burner. One of the inherent problems with the new "low NOx" burners is the limited turndown to maintain emission values.
2. Whereas, there has been discussions of increased efficiency with the installation of new low NOx burners, the opposite can also be true due to the manufacturers having to use more excess air to lower flame temperatures and thus reduce NOx. If the existing burner is ratio fired and the new burner has to use 60 – 80% excess air to achieve the emission reductions, the total gas usage can actually increase. This becomes a problem if the existing burner is just marginally over the 1147 limit, the new burner that is installed can actually put more pollution into the air even with lower NOx values due to efficiency losses.
3. Other burners mentioned in the Technology Assessment (outside of the major manufacturers) are specific use burners and can only be used in very specific applications.

PTE:

4. Since PTE assumes maximum BTU input, 24 hours per day and no devices operate under those conditions, a better method of determination is necessary. A simple methodology by using reference charts and dialogue sent to staff for determining #/day is the most sensible approach.
5. The use of non-resettable timer for small units can satisfy this analysis
6. We evaluated a facility that operates 24/7 heating tanks with on/off temp control. Based on therms used to PTE they operate at about 15% PTE

Furnace dynamics, inc.

261 Euclid Ave.
Long Beach, CA 90803
562-433-3025

7. Many other examples exist of actual use vs. PTE show a range of 10.49% - 25% of PTE

Rule Compliance Date Issues

1. Will the compliance dates be extended due to substantial rule changes?
2. If there is a 2016 compliance date for a device that will be effected by the rule change, can the proposed rule changes be applied?

Mitigation Fee

1. Extremely costly related to RTCs considering a typical RTC is going for about $0.60/lb. The Mitigation fee of $10.50/pound for a 3-year period, to be paid for by the permit holder is not comparable with other programs and after the fee is paid, the installation is still required which can significantly increase the cost of reduction. This issue should be taken up in the rule development phase of the modification to Rule 1147.
2. We need to explore another alternative method of offsetting emissions for low emitting sources. This again places a disproportionate economic burden on small business.
3. Consider a non-RECLAIM method of funding cost effective projects

We appreciate your consideration of the above and look forward working with staff in the ongoing efforts to address the considerable issues relating to Rule 1147.

Sincerely,

Anthony W. Endres
President

Appendix C, Attachment C-3

Stakeholder Item #3 – Furnace Dynamics, Inc.

SCAQMD MINOR SOURCE BACT
COST EFFECTIVENESS CALCULATION

Type of Project		**Smokehouse AB**	
Use			
Hours per Day		1.55	
Days per Week		5	
Weeks per Year		20	
Annual Hours of Use		155	Hours
Gross Input BTU/hr		260,000	BTU/hr
Average Input (%)		100%	% Input
Average BTU Input		260,000	BTU/hr
Starting Emissions		101.4	ppm
Pounds/MMCF		130.00	#/MMCF
Pounds per Hour		0.032	
Pounds per Day		0.050	
Annual Emissions		**4.99**	**# NOx/Year**
Modified Source Emissions			
Average Input (%)		100%	% Input
Average BTU Input		260,000	
Starting Emissions		30	ppm
Pounds/MMCF		38.46	#/MMCF
Pounds per Hour		0.010	
Pounds per Day		0.015	
Annual Emissions		1	# NOx/Year
Annual Reduced Emissions		**4**	**# NOx/year**
Annual Tons Reduced		0.002	**T/Y Reduced**
10 Year Emissions Reduction		0.018	**Tons**
Equipment Costs			
Burners	$	30,000	
Engineering			
Piping Costs			
Installation Costs	$	1,500	
Refractory Cost			
Start Up Costs			
Gas Meter & Gages	$	-	
Permit to Construct Fee	$	2,200	
Source Test Evaluation Fee	$	611	
Source Test	$	3,000	
Equipment Cost	**$**	**37,311**	
Annual Costs			
Periodic Maintenance	$	400	per year
Annual ST Fee	$	100	per year
Total Annual Cost	$	500	
Cost 10 Year Cost	$	5,000	
Annual Cost (10 year average)	**$**	**500**	
DCF Cost Per Ton Reduced	**$**	**2,354,801**	

Appendix C, Attachment C-4

Stakeholder Item #4 – Furnace Dynamics, Inc.

SCAQMD MINOR SOURCE BACT
COST EFFECTIVENESS CALCULATION

Type of Project	**Afterburner**	
Use		
Hours per Day	9	
Days per Week	0.9	
Weeks per Year	50	
Annual Hours of Use	405	Hours
Gross Input BTU/hr	5,000,000	BTU/hr
Average Input (%)	30%	% Input
Average BTU Input	1,500,000	BTU/hr
Starting Emissions	101.4	ppm
Pounds/MMCF	130.00	#/MMCF
Pounds per Hour	0.186	
Pounds per Day	1.671	
Annual Emissions	**75**	**# NOx/Year**
Modified Source Emissions		
Average Input (%)	30%	% Input
Average BTU Input	1,500,000	
Starting Emissions	60	ppm
Pounds/MMCF	76.92	#/MMCF
Pounds per Hour	0.110	
Pounds per Day	0.989	
Annual Emissions	45	# NOx/Year
Annual Reduced Emissions	**31**	**# NOx/year**
Annual Tons Reduced	0.015	**T/Y Reduced**
10 Year Emissions Reduction	0.154	**Tons**
10 Year Emissions Reduction	307	**Pounds**

Equipment Costs			
Burners	$	110,000	
Engineering			
Piping Costs			
Installation Costs			
Refractory Cost			
Start Up Costs			
Gas Meter & Gages	$	2,500	
Permit to Construct Fee			
Source Test Evaluation Fee	$	611	
Source Test	$	2,500	
Equipment Cost	**$**	**115,611**	
Annual Costs			
Periodic Maintenance	$	500	per year
Annual ST Fee	$	100	per year
Total Annual Cost	$	600	
Cost 10 Year Cost	$	6,000	
Annual Cost (10 year average)	**$**	**600**	
DCF Cost Per Ton Reduced	**$**	**784,642**	

APPENDIX D

STAKEHOLDER COMMENTS RECEIVED SUBSEQUENT TO RULE 1147 TASK FORCE MEETING AND BY AUGUST 23, 2016 DEADLINE

SUMMARY OF INFORMATION RECEIVED FROM STAKEHOLDERS SUBSEQUENT TO RULE 1147 TASK FORCE MEETING

ITEM #	DESCRIPTION OF INFORMATION RECEIVED BY ETS	NAME/TITLE	COMPANY	ADDITIONAL RELEVANT INFORMATION	DATE RECEIVED BY ETS	FOLLOW-UP BY ETS
Information Received Subsequent to Rule 1147 Task Force Meeting, But Prior to August 23, 2016 Deadline:						
5	E-mail with subject line "Emailing: img083.pdf" and attachment file "img083.pdf" (3 pages). First page of attachment contained a product sheet on Titan Industrial Heating Systems Immersion Tube Gas Burners and the second & third pages contained emails between Stakeholders about the applicability of the burner in a wash tank.	Jim Waggoner, CEO	Industrial Process Equipment, Inc.		08/04/16	ETS response in Section VIII.E of ETS Independent Technical Review Document
6	E-mail with no subject line. Stated that an average burner replacement with a low nox burner is $27,000 plus AQMD permits, source testing, any city permits, and down time costs being the line is shut down.	Jim Waggoner, CEO	Industrial Process Equipment, Inc.	Stated that it could be more money if they do not have enough gas pressure in the plant to service the new burner	08/04/16	ETS response in Section VIII.F of ETS Independent Technical Review Document
7	E-mail with attachment containing a letter titled "Re: SCAQMD Technical Assessment" (2 pages). Letter states concerns for SCAQMD Draft Technology Assessment of the "burner availability and feasibility to retrofit units". Second area of concern is regarding heated process tanks, evaporators and parts washers - "opinion that not only a good replacement burner does not exist to meet the required firing conditions for immersion heating, but a good immersion burner that will meet a <60 ppm NOx requirement for new units does not exist". Third area of concern is that "exempting existing units until the tank is modified or replaced encourages industry to continue to use old, outdated, in-efficient equipment as long as possible."	Allan Roughton, Sales Engineer	Wirth Gas Equipment, Inc.		08/18/16	ETS response in Section VIII.G of ETS Independent Technical Review Document
8	Packet of information received by mail with letter titled "Attention: Rule 1147" which describes why "the tube fired washer burners should be exempt along with other burners in this category or change the rule to 100 PPM". Information provided on the following burners: Eclipse ImmersoJet (IJ), Maxon Tube-O-Therm, Maxon XPO Immersion, Titan Immersion Heater. Comparison drawings of heated washer tanks with an Eclipse IJ6 burner tube arrangement and a Maxon XPO burner, including a washer BTU/hr burner sizing worksheet.	Jim Waggoner, CEO	Industrial Process Equipment, Inc.	Jim Waggoner states that he has been building spray washers for over 43 years. He also provided a "chart of companies that have shut down or moved out of California due to the costs of doing business in California".	08/23/16	ETS response in Section VIII.H of ETS Independent Technical Review Document

SUMMARY OF INFORMATION RECEIVED FROM STAKEHOLDERS SUBSEQUENT TO RULE 1147 TASK FORCE MEETING

ITEM #	DESCRIPTION OF INFORMATION RECEIVED BY ETS	NAME/TITLE	COMPANY	ADDITIONAL RELEVANT INFORMATION	DATE RECEIVED BY ETS	FOLLOW-UP BY ETS
Information Received Subsequent to Rule 1147 Task Force Meeting, But Prior to August 23, 2016 Deadline:						
9	E-mail with subject line "Tech Assessment" and attachment file titled "Tech Assessment Complete.pdf" (16 pages). The file includes a write-up with regards to the SCAQMD Draft Technology Assessment, a comprehensive evaluation of a company that is now in compliance with the rule (Exhibits A through I), additional comments regarding a couple of other applications, and a cost effectiveness spreadsheet for an auto body spray booth (Exhibit J).	Anthony Endres, President	Furnace Dynamics, Inc.	Anthony Endres indicated that there was some financial information that should be maintained in a confidential basis, so Exhibits A - J were excluded from the ETS report.	08/23/16	08/26/16 - Email sent by ETS to Anthony Endres with an attachment letter containing a list of ETS clarifications & questions on the comprehensive evaluation presented in the "Tech Assessment Complete.pdf" file.
Information Received After August 23, 2016 Deadline, But Continuation and Follow-up of Item #9:						
9a	E-mail with subject line "Responses to your questions" and the following attachment files: 1) "Response to Christine Clark 1147 Letterhead.pdf" (8 pages), 2) "Burner Retrofit Info.pdf" (1 page), and 3) "Autobody Industry Summary.pdf" (2 pages). The files include responses to the ETS request for specific clarifications and answers to questions on the comprehensive evaluations presented in the Furnace Dynamics, Inc. "Tech Assessment Complete.pdf" file.	Anthony Endres, President	Furnace Dynamics, Inc.		08/31/16	09/01/16 - Email sent by ETS to Anthony Endres requesting a summary sheet from the source test results for a particular oven that was stated as being included in Item #9a. ETS could not find a source test summary sheet in the Item #9a files received.
9b	E-mail with subject line "Re: Responses to your questions" and an attachment file titled "ST Results Normal Firing all ovens.pdf" (7 pages). The attachment file contained source test summary sheets for 7 different ovens with the title sheet for each oven containing the words "Low Load".	Anthony Endres, President	Furnace Dynamics, Inc.		09/01/16	09/09/16 - Email sent by ETS to Anthony Endres requesting the normal/high load source test summary sheets corresponding to the low load sheets received for the 7 ovens in Item #9b.
9c	E-mail with subject line "ST High Load Data" and an attachment file titled "ST High Load.pdf" (8 pages). The attachment file contained source test summary sheets for 8 different ovens. The first 7 sheets had 7 different oven names as received in Item #9b with the title sheet for each oven containing the words "High Load". The 8th sheet was a different style of source test summary sheet for an 8th oven name.	Anthony Endres, President	Furnace Dynamics, Inc.		09/12/16	ETS response to Items #9, 9a, 9b, and 9c located in Section VIII.I of ETS Independent Technical Review Document

Appendix D, Attachment D-1

Stakeholder Item #5 – Industrial Process Equipment, Inc.

Titan Industrial Heating Systems
www.titanindustrialheating.com
Phone: (562) 951-9500 info@titanindustrialheating.com

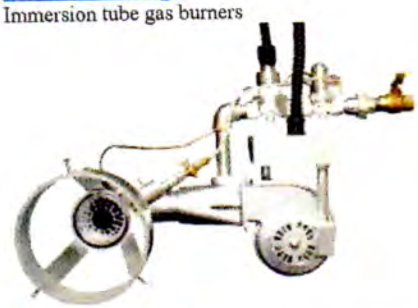
Immersion Tube Gas Burners

Immersion tube type gas burner systems are commonly used on hot caustic, Alkaline, Sodium dichromate, black oxide and hot seal tanks.

Use a Titan Industrial Heating Systems Gas Burner 4" or 6"and your heating problems are solved.

Please contact us for application assistance.

Click to enlarge
Immersion tube gas burners



Click to enlarge
450K Dual Immersion Tube Gas Burners for alkaline tank

Jim Waggoner

From: Anthony Endres <awefdi@gmail.com>
Sent: Wednesday, August 03, 2016 3:37 PM
To: Jim Waggoner
Subject: Wayne's comments.

Jim,

* I particularly like the comment using a bunch of the small burners and tubes to achieve the 50 ppm results. That would make an interesting wash tank and you would have fun with the tubes in the tank.

Tony

--

FDI

Innovative Consulting & Furnace Designs for Industry
Anthony Endres
President
Furnace Dynamics, Inc.
Phone: 562-433-3025
Fax: 562-433-9282
Cell: 562-480-8833

Jim Waggoner

From: Allan Roughton <allanr@wirthgasequipment.com>
Sent: Thursday, August 04, 2016 9:47 AM
To: Jim Waggoner
Subject: RE: Emailing - html2ps.pdf

Jim – Now that's a real throw back to the 1950's! Talk about 10 steps backwards with efficiency. If it's <2.0mm Btu/hr. and the process isn't regulated it doesn't need a permit in the first place. Another example of double talk from the district.

A

From: Jim Waggoner [mailto:JimW@ipeontime.com]
Sent: Wednesday, August 03, 2016 2:10 PM
To: Anthony Endres; Allan Roughton
Subject: Fwd: Emailing - html2ps.pdf

Hi, this is Wayne's tube fired burners less than 60 ppm. No larger than 450,000 btu s Jim

Sent from my iPhone

Begin forwarded message:

> **From:** "Wayne Barcikowski" <wbarcikowski@aqmd.gov>
> **To:** "Jim Waggoner" <JimW@ipeontime.com>
> **Subject: Emailing - html2ps.pdf**
>
> Jim,
>
> This is an information sheet on the immersion burner line that has been tested with results below 60 ppm.
>
> Wayne

Appendix D, Attachment D-2

Stakeholder Item #6 – Industrial Process Equipment, Inc.

Christina Clark

From: Jim Waggoner <JimW@ipeontime.com>
Sent: Thursday, August 04, 2016 7:54 PM
To: christinac@etsi-inc.com

Follow Up Flag: Follow up
Flag Status: Flagged

Hi Christina, an average burner replacement with a low nox burner is $ 27,000 plus AQMD permits, Source testing and Down time costs being the line is shut down and any city permits. Could be more money if they do not have enough gas pressure in there plant to service the new burner.

Thank you

Jim Waggoner
CEO
Industrial Process Equipment, Inc.
1700 Industrial Ave, Norco, Ca. 92860
Ph (951) 808-9192 Ext 313 Fax (951) 808-9193 Cell (714) 984-4783
e-mail jimw@ipeontime.com
IPEwebsite links: WWW.IPEONTIME.COM
Lasernut profile video: http://www.youtube.com/watch?v=YN75vyjMVNM
Lasernut website: **www.lasernut.com**
"We Fabricate Your Future"

Appendix D, Attachment D-3

Stakeholder Item #7 – Wirth Gas Equipment, Inc.

WIRTH GAS EQUIPMENT, INC.
P.O. BOX 3277 · GLENDALE, CA 91221
1233W. GLENOAKS BLVD. · GLENDALE, CA 91201
PH: 323-245-9523 · AZ: 602-254-6225 · FAX: 818-243-3382

August 18, 2016

ETS, Inc.
Christina Clark
1401 Municipal Read NW
Roanoke, VA 24012

Re: SCAQMD Technical Assessment

As a supplier of industrial combustion equipment I am particularly concerned in regards to the districts assessment of the "Burner availability and feasibility to retrofit units." They initially state, "testing program indicates that the rule limits are achievable for all categories of equipment with current available technology," and then proceed to note three areas where in fact that is not the case.

They acknowledge the existence of oven burners rated for 400K Btu/hr. capable of meeting the <30ppm Nox emission limit. They then proceed to recommend exemptions for burners with a maximum rated capacity of 325K Btu/hr. or less. In other areas of this document they address the delay or exemption for equipment that produces < 1lb. of Nox emissions per day. If this is in fact the criteria I suggest they make the exemption for all processes/equipment at this level. If you review the Eclipse product catalog you will note this manufacture offers fifteen different style burners for air heating applications, four different style burners for furnace applications, and four different style burners for tube firing applications. Due to the design of the different burners they are capable of varying emission levels. There are cases where one style burner capable of firing at 1.0mm Btu/hr. produces 60 ppm Nox which at full capacity for twenty-four hours equals 1.464 lbs. and yet a different style produces 40ppm Nox at high fire resulting in 0.864 lbs. Under the district's proposal of exempting burners at the 325K Btu/hr. level both burners would be unacceptable and yet the < 1lb. criteria could be met with option two. The districts approach suggests any burner firing at or less than 325K Btu/hr. will produce < 1lb. of Nox in a 24 hour period. This also suggests a burner fires at full capacity the entire time it is in operation. Both of these assumptions are false and do not represent real world situations. This is like assuming since all cars have four wheels and an engine they are all capable of doing 150 mph and getting 50 mpg, while doing it.

The second area of significant concern is the heated process tanks, evaporators and parts washers. In exempting existing units from meeting a <60 ppm requirement they are acknowledging that a good replacement piece of equipment does not exist. They state their testing has identified three types of heating systems that comply with the Nox emission limit and yet do not specifically identify what these systems are. As one who has supplied combustion equipment for these applications for over forty years

I do not know what equipment the district is aware of and do not understand why this information is not provided by the district if in fact it does exist.

It is my opinion that not only a good replacement burner does not exist to meet the required firing conditions for immersion heating, but a good immersion burner that will meet a <60 ppm Nox requirement for new units does not exist. The only unit I am aware of, which is available from a division of our principal company, requires firing tubes that are four times larger than current standard equipment. Using this "low Nox" option requires a tank that needs to be four times deeper to accommodate the tube. A deeper tank means more solution which means higher Btu/hr. input to heat more solution which means more lbs. of emissions. One step forward and ten steps backwards.

Exempting existing units until the tank is modified or replaced encourages industry to continue to use old, outdated, in-efficient equipment as long as possible. Additionally it does not honestly address the need for new equipment and falsely supports the suggestion that equipment to meet this requirement in a properly engineered design exists.

Thank you for your consideration of the issues I have raised. Please feel free to contact me if you have any questions or need any clarification. I have enjoyed helping industry meet their industrial heating requirements in an efficient, practical, and clean fashion for many years and hope to be of benefit for the future.

Regards,

Allan Roughton

Allan Roughton

Appendix D, Attachment D-4

Stakeholder Item #8 – Industrial Process Equipment, Inc.

NOTE: All of the Burner Manufacturer Information and CAD Drawings That Were Mailed to ETS from the Stakeholder for the Information Discussed in Item #8 Have Not Been Included in This Report, but Can Be Provided if Needed

See us on our website: www.ipeontime.com

August 22, 2016

Attention: Rule 1147

To Whom It May Concern, I have been following rule 1147 for many years. I have been building spray washers for over 43 years.

In one of the meetings they changed the ovens burners from 20 ppm to 30 ppm due to the fact there were no burners that would comply. Staff did not have technical backing to support a burner to meet the 20 PPM.

The washer burners did not get the same attention. I feel the tube fired washer burners should be exempt along with other burners in this category or change the rule to 100 PPM.

From my findings:

I have provided information on the Eclipse IJ burners along guarantees of their NOX levels for some of the different size burners and specs on the burners. The NOX numbers range from 80 to90 PPM@3% 02 dry.

I have provided information on the Maxon Tube O Therm tube fired burner, in their literature there is no commitment to any guarantees or listing of their NOX levels. This Maxon Tube O Flame burner is somewhat a comparison choice to the Eclipse IJ tube fired burner.

I have supplied information on the <u>Maxon XPO Immersion</u> burner, information shows no NOX information. One of the problems with retrofits and even new applications for this type of new burner is the first 8 feet of the fire tube is 24” in diameter versus the Eclipse IJ 8” tube diameter 3’000’000 BTU/Hr and the Maxon Tube O Therm 8” tube diameter 3.5 million BTU/Hr. The small tube to me is very efficient due to the fact it will not get the chemical building up on the tube and not allowing heat to get out of the tube. The old stile burners where larger and the chemical would build up and the fire tubes would burn up because the heat could not get out of the fire tube to the water due to the insulating effect from the chemical building up. The burners prior to these new style burners were 69% efficient, Maxon Tube O Therm and the Eclipse IJ burners are 80% efficient. The tube sizes were larger in diameter.

I would add that even the Maxon XPO burner is not a good solution for even a completely new application since the tank would have to be significantly deeper, thus requiring more water and more heat input to heat the water. Additionally, the heat exchanger layout could not be well accommodated. Thus there are not good solutions to wash tank applications and thus the wash tank applications should be exempted from the rule. I believe this burner has not been achieved in practice on enough pieces of equipment, this needs to be addressed to when and where these pieces of equipment have been used and tested.

I have supplied information on the Titian Heater, no information or guarantees on the NOX level. There max firing rate is 450,000 BTUs/Hr. Most of our washers are 2,000,000 BTUS/Hr or more. The tube diameter is 4” to 6”. You would need 5 burners and tubes to do 2,000,000 BTUS/Hr. Not a practical or efficient design. There is no good way of cleaning the tubes and you would need to put somewhere? There would be 5 stacks going up thru the roof. This is an old style application. Goes back to the first washer ever built.

Please see the Comparison Drawing of the tanks with an Eclipse IJ6 burner tube arrangement and a Maxon XPO burner. Please see the difference in the tube layout and the tank size. The spray washer tank that we have drawn is for a washer spraying 860 gallons per minute of spray at 140 degrees F. I supplied BTU calculations for this type application. This application requires this size burner to heat up the amount of gallons at start up. When the solution gets to temperature the burner throttles down as low as 500,000 BTUS/Hr. and keeps the solution at temperature. When the tube fired burners throttle down is when the NOX levels go up.

I have a Major Question since the rule was started years ago, I have been asking the district and staff for years about what was the mean when the rule was started or what is the goal to achieve as far as a reduction of NOX. I provided a chart of companies that have shut down or moved out of California due to the costs of doing business in California. One major cost is dealing with AQMD. Just the BTUS/Hr that I know of, adds up to 373,620,000 as you can see on my sheet. Seems the goal is having no manufacturing in California.

If you should have any questions, please feel free to ask.

Sincerely,

Industrial Process Equipment Inc.

Jim Waggoner
President
Industrial Process Equipment Inc.
Ph 951 808-9192 ext 313
Company Fax 951 808-9194
Cell 714 984-4783
E Mail: jimw@ipeontime.com

Appendix D, Attachment D-5

Stakeholder Item #9 – Furnace Dynamics, Inc.

NOTE: Stakeholder Item #9, Exhibits A - J Were Excluded From This Report Due to Stakeholder Request to Maintain Company Confidentiality Regarding Financial Information

Furnace dynamics, inc.
261 Euclid Ave.
Long Beach, CA 90803
562-433-3025

August 23, 2016

Ms. Christina Clark
Engineering Manager
ETS, Inc.
1401 Municipal Road, NW
Roanoke, VA 24012

Dear Christina,

I have included an overview of the Technology Assessment as well as a case study of a specific plant that is now in compliance with Rule 1147. The facility is a job shop powder coating company. We received actual accounting of dollars spent in compliance that include all phases of each project this formed the basis for our cost effectiveness evaluation.

Personnel Background: I have been involved with combustion devices since 1971 with the development of an advanced technology boiler. In 1980 I started a company to engineer, design and manufacture waste heat recuperators to be applied to high temperature forge and heat treat furnaces. I have been providing clients energy efficiency consulting from 1980 to the present. Over the years we have designed the combustion systems for approximately 120 furnaces in forge, heat treating and the metal melting industries. Concurrent with the energy efficiency consulting, we have set up the combustion systems for approximately 7,000 temperature uniformity surveys to satisfy aerospace requirements. We have also engineered and designed many heat treat and forge furnaces that will accommodate furnace loads of up to 200,000 pounds and temperatures up to 2300F. Through the last 29 years we have been providing air quality consulting to a wide variety of organization disciplines and have assisted staff in rule development for the RECLAIM Program and multiple other rules including Rule 1147.

Technology Assessment: The Technology Assessment covers a vast array of devices included in Rule 1147. Based on the database I received from staff on the devices included in 1147, there are approximately 270 categories of equipment contained therein and approximately 6,500 devices. With the limited ETS contract value, it would be impossible to evaluate a large number of sources. I therefore recommend that a relatively few (but representative) number of sources be evaluated where actual data exists. We have provided data from one such facility for your evaluation and consideration. The data provided represents the real cost of compliance and the real cost effectiveness of the retrofits. See Exhibits A – I.

Furnace Dynamics, Inc.
261 Euclid Ave.
Long Beach, CA 90803
562-433-3025

General Comments Regarding the Technology Assessment: There are a couple of actual examples of where the staffs position and reality depart. A case in point is one of our forge company clients. Whereas, I was able to conduct some fine tuning and get 7 of the 8 furnaces to comply, the last could not be tuned into compliance. Quotes were obtained from the five largest burner manufacturers. All suppliers would guarantee the NOx values but none would also guarantee an acceptable temperature uniformity survey required by the aerospace industry. If you cannot pass an acceptable uniformity survey, you cannot use the furnace. In this case the issue was trying to adopt a low NOx burner to a furnace that was not designed for their use at the time of construction.

There are other examples of the same issues. In the meeting with staff, Mr. Barcikowski suggested there was an acceptable emersion heater burner that could be used in wash tanks. The burner has a maximum input of 450,000 BTU/hr. On a 3MMBTU/hr application there would have to be over 6 burners each with its own immersion tube. Due to the nature of these tank designs this is not an acceptable solution and thus should not be given any consideration. There are also Maxon XPO burners for immersion tube applications, they require a tube of between 18" – 22" in diameter that would extend into the tank up to 6 feet. To accommodate the larger burner, the tank would have to be deeper and potentially wider. This would require a larger amount of water or solution to be heated thus more BTU input. For numerous reasons this is not an acceptable solution. Thus these wash tank applications should be exempted and even new applications would not be deemed feasible. These are just a few examples, there are probably many related to the unacceptable nature of a retrofit project.

We have included a cost effective spreadsheet that relates to a typical auto body spray booth retrofit application. As with the other comparisons, both a PTE vs. actual evaluation are included. See Exhibit J.

ETS Consulting:
In the meeting with stakeholders and staff you heard staff indicating they must use default emission factors. However, we believe the public, the SCAQMD Governing Board, the ARB and EPA should be told the emissions profile and cost effectiveness that relates to individual units compared to assumptions based on default values. To achieve this, actual case studies should have been involved, not gross assumptions. At the outset of rule development, actual case studies should have been conducted to provide assurances that the basis of the program was valid and represented real emission values and actual cost effectiveness evaluations. By using assumed values and potential to emit criteria, the initial emissions from the array of sources included in Rule 1147 is over stated as well as the amount of reductions achieved by the rule. At the same time the cost effectiveness can be vastly understated.

Furnace Dynamics, Inc.
261 Euclid Ave.
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Pretesting to Determine the Current State of Compliance: We use one of the new Testo 350 emission analyzers. It is the most advanced analyzer on the market. Over the last 3 years, we have conducted approximately 190 pretests. Approximately 2% of those tests were conducted on larger furnaces that fall under the RECLAIM Program. The rest have been Rule 1147 devices. They include heat treat, forge, powder coating, precision casting, etc. The temperature ranges run from about 300F to 2250F. We have also conducted approximately 70 parallel tests with official source test companies. Predominantly, our results are within 2 ppm NOx of the official test. I have gone through the SCAQMDs work shop on using portable analyzers and passed the test required for certification. Our goal is to inform companies of their compliance status and determine if retrofitting of the equipment is required. Refer to Exhibit A for pre testing data.

We also have provided tuning of the equipment to determine if compliance can be achieved. With our software and a laptop computer connected to the analyzer, we can observe, in real-time, the results of the tuning activity. Within the confines of the tuning activity, we will evaluate how the equipment is normally operated for the job done at the client site. We will make adjustments to determine if compliance can be achieved – without having any negative impact on the company's normal operation. Whereas, not all tuning attempts are successful, we have adjusted or worked with others to fine tune approximately 37 devices that would not have complied in the initial state of tune. The savings to clients amounts to about $1.3 million in not having to retrofit their equipment.

Facility Evaluation: I have chosen a facility where we conducted extensive pre testing in order to determine the compliance status. This testing formed a basis for the company to embark on a retrofit program prescribed under Rule 1147. We have included the results of my pretesting of their ovens. We acquired a spreadsheet of the costs associated with each retrofit conversion. The values were then used as a basis of comparing the existing emission values and thus the overall reduction and then the cost effectiveness of each device. The average firing rates were derived from actual source testing data. These values were used as the average firing rates of each of the ovens evaluated. It is important to understand that the indicated average is relevant to the understanding how the equipment actually operates. The firing rate for each oven is controlled by a temperature controller. The temperature range for this equipment is from 325F to 700F. A set point is selected and the equipment is fired to accommodate that set point. Due to the relatively low temperature of operation, the temperature is reached rather quickly, then the burners are throttled back to maintain the set point value during the production cycle. An interview with management provided the hours per day of operation. These were also used in the cost effectiveness evaluation.

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Cost Effectiveness: I have provided some cost effectiveness charts for a specific facility and their individual equipment where upgrades to their equipment were made and source testing was successfully completed. To assure consistency with staff's methodology, I created a spreadsheet using the same formulas found in the Districts Minor Source BACT Guidelines and the same values that are illustrated in the guidelines to assure the methods are consistent with what staff used in the initial evaluation. Staffs' and our numbers compare to the exact same dollar per controlled ton.

With the attached spreadsheets, I illustrate the actual hours of operation, days per week, weeks per year, starting emission factor, the rule compliance emission factor and the costs associated with the retrofit. The formula includes the cost of money and follows the discounted cash flow (DCF) method of evaluation. Therefore, real, actual information can be evaluated. For comparison, we have included a spreadsheet next to the actual that would indicate how the District might conduct the same evaluation. As you observe there are dramatic differences. In the 2008 staff report, the cost effectiveness was stated to be in a range from \$3,000 to \$17,000 per controlled ton of emissions reduction. At a recent 1147 task force meeting, staff indicated the average cost effectiveness is \$26,000 per controlled ton. At the same time, they indicated they did not do any individual analysis. We are not sure how it is possible to provide a definitive value and then indicate no individual analysis was conducted.

You will observe, the cost effectiveness varies dramatically due to hours of operation, initial emission factors and cost to modify. It should be noted that these are real values not default or assumed values. In this company the actual cost effectiveness ranged from \$58,157/t to \$499,000/t. See Exhibits D – I.

Cost Effectiveness Methodologies: There were multiple values illustrated in the technology assessment. They varied in duration of the starting and ending points. Some had a 10-year cost effectiveness value and some had 15 year or even a 20 year criteria used for the evaluation of cost effectiveness. We have always been a proponent of utilizing a singular methodology of determining cost effectiveness. This has been expressed to senior staff as well as to the Executive Officer. We have also suggested that the cost effectiveness criterion should be uniform for all 1147 devices. Additive to the above, a singular – not to exceed value should be established. If the cost effective value is exceeded, an extension for compliance should be issued with enforceability included.

As you review the accompanying documents, it will become very apparent that cost effectiveness should be conducted on a case by case basis. Staff opposes this due to the extra work involved. We have offered to assist in streamlining this effort – to no avail.

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Actual Numbers vs. Default Values: It is important that we provide actual numbers that represent actual information relating to specific devices. We have provided a profile of an actual facility. This facility has pretested the existing equipment to determine compliance and upgraded all their equipment that would not comply. In this case an existing burn off furnace was adjusted to a NOx value that proved compliance and was successfully source tested. In the company illustrated in our profile, we were not able to tune one of the burn off ovens. The result was the client spending $94,230 to purchase a compliant replacement device.

None of the other devices pretested would pass the 30 ppm compliance requirement. In my evaluation, I have used the actual starting ppm for each device to show a comparison to the Districts default values. See the section on pretesting. The approach was to look at the actual daily use in hours then use a value that would represent the Districts approach of using 100% firing rate for the normal hours of operation and also using the default emission factor that the staff uses of 130#/MMcf natural gas (101.4 ppm). If the values for each device were to be determined based on a 12-hour day, the values would be skewed even more.

There was one oven where the O2 values were above the 19.5% where my analyzer cuts off. All the remaining ovens were pretested to determine compliance. There were cases where some of the equipment showed issues that required additional maintenance prior to determining if compliance was possible.

Cost of Compliance: We have provided a spreadsheet that came from the client to show the various costs for each device. The numbers vary significantly. This is due to the amount of work required to install the equipment. Significant sheet metal modification was sometimes required to accommodate the new burner configuration. In some cases, the gas train had to be updated to assure compliance with current standards.

The included spreadsheet documents the expenditures to assure compliance. The grand total was approximately $362,683. There are some minor additional costs that will still come in due to an oven that needs to be source tested. See Exhibit C for cost evaluation.
These values include:

1. Application fees
2. Burner costs
3. Installation costs
4. Protocol fees
5. Source testing costs
6. Source test report evaluation costs

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There is also a cost of $12,345 that went to pretesting the various devices and conducting some parallel testing with the source test company. These are all real costs to industry.

Conclusions: The Technology Assessment is rather comprehensive in nature. However, we find fault in the cost effectiveness numbers due to staffs' using default numbers and potential to emit. We have provided a series of spreadsheets that can be evaluated to determine what constitutes one pound per day of NOx based on BTU input and hours of operation at a number of average BTU inputs from PTE to an average of 20% of PTE.

It is important the staff knows that real number are more important than assumed values. Assumed value understate the cost effectiveness and overstate the actual reductions. The public, the Governing Board, California Air Resources Board and the EPA need to be advised of the real costs to industry. It does require more effort from staff in the rule making process and stakeholders need to be intimately involved in the process of developing rules. The burden of high cost effectiveness, expensive rules and sometimes marginal environmental impact should not fall on small businesses.

Should you have any questions regarding the information supplied please feel free to call me any time and I will be happy to assist you.

Sincerely,

Anthony W. Endres
President

Enc.

APPENDIX E

STAKEHOLDER COMMENTS RECEIVED AFTER AUGUST 23, 2016

SUMMARY OF INFORMATION RECEIVED FROM STAKEHOLDERS AFTER AUGUST 23, 2016 DEADLINE

ITEM #	DESCRIPTION OF INFORMATION RECEIVED BY ETS	NAME/TITLE	COMPANY	ADDITIONAL RELEVANT INFORMATION	DATE RECEIVED BY ETS	FOLLOW-UP BY ETS
Information Received After August 23, 2016 Deadline:						
10	E-mail with subject line "Emailing: img131.pdf" and an attachment file titled "img131.pdf" (3 pages). The attachment file contains an undated letter addressed to Wayne Barcikowski of SCAQMD. The letter concerns were regarding the amount of burners that needed to be changed by July 2012. The Stakeholder also suggested rule amendments for the "added categories that work for the different applications" and for burners that are on the market and have been achieved in practice for a minimum of one year. The final page of the Stakeholder letter recommends "getting with burner manufacturers to see if the below are correct categories that they can make burners for and to what type of burner will meet the PPM requirements. When can they meet the PPM requirements and then implement them into the rule."	Jim Waggoner, CEO	Industrial Process Equipment, Inc.		09/02/16	ETS response in Section IX.A of ETS Independent Technical Review Document
11	E-mail with subject line "Emailing: 25760-1- System Layout PDF.pdf" and an attachment file titled "25760-1- System Layout PDF.pdf" (1 page). The attachment file contains a CAD layout drawing dated 11/11/15 of a Conveyorized Powder Coat System with the following: a Spray Power Washer in the front that goes to a Dry Off Oven, then cools down to Two Powder Booths, and then to the Cure Oven, and then to the Unload Area.	Jim Waggoner, CEO	Industrial Process Equipment, Inc.	Attachment file "25760-1- System Layout PDF.pdf" was excluded from the ETS report since it contained client-specific details for a system located in Texas	09/02/16	ETS response in Section IX.B of ETS Independent Technical Review Document
12	E-mail with subject line "1147 Documents submitted to staff in 2008" and attachment file titled "2008 Letter to staff re 1147.pdf" (28 pages). The attachment file contains an undated document from Anthony Endres of Energy Services Corporation addressed to Wayne Barcikowski. The letter discusses the applicability of the 60 ppm NOx emission limit to different types of metal melting and heat treating furnaces. The commenter proposes each type of furnace should have a different NOx emission limit. The letter also contains a general discussion of BACT for new metal melting and heat treating furnaces that proposes that each type of furnace should have its own BACT limit. Finally, the Stakeholder recommends the use of a pounds per hour basis for determining compliance based on the pounds per hour emitted at 100% for a given burner or classification of equipment.	Anthony Endres, President	Furnace Dynamics, Inc. (Energy Services Corporation)		09/20/16	ETS response in Section IX.C of ETS Independent Technical Review Document

Appendix E, Attachment E-1

Stakeholder Item #10 – Industrial Process Equipment, Inc.

Wayne Barcikowski
Air Quality Specialist
SCAQMD
21865 Copley Drive
Diamond Bar, Ca. 91765

Mr. Barcikowski,

Thank you for allowing rule 1147 to be amended.

As you know this rule allows us added business so we are not here to stop any progress.

The reason that I will be mentioning the below is that I do not want to see companies in a penalty situation as to the reason it was important to put the rule on hold before the end of the year. This would cost business's time and money to deal with. Thank you.

There are too many burners in the industry to change by July 2012. It has taken 4 months to get permits to construct and I know of others waiting for months to get an acceptance to the test protocol after they get the permit to construct.

We need to have the rule amended for the added categories that work for the different applications. The rule is way to general for this industry.

I believe the rule needs to be amended for what is on the market and the burners are achieved in practice for a minimum of one year. I know the smallest Low Nox Burner that Eclipse makes is a 500,000 BTU which works very nicely for an oven application. One of the situations is that we use to put in oven burners that were 1,500,000 BTU'S and now we would have to put in 2,000,000 BTU burners on. The burners use more gas do to the fact that the burner requires more ambient air to get the same Btu's as the old burners and as you can see the burners require to be larger. This follows the same perimeters as the burners go up in sizes.

Multiple units, dead line to me does not work. Some people have more than 20 burners to rework. What does that look like in a feasibility study?

We have actual costs for one burner up grade of $ 26,865.32 plus down time of the factory.

No equipment normally is exactly the same, each burner needs to be adjusted at the time of start up. We manufacturer ovens from 2700 square foot to 80 square foot. This does not allow for having equipment certified.

Burn Off Systems, heating chamber and afterburner. This equipment works in conjunction with each other with all the effluent going through the afterburner. This unit is not an oven/afterburner. AQMD permits are specified to run the afterburner and then turn on the oven. Both units can not work separately due to the safety circuit.

What happens in 15 years if there is nothing better to go to?

I believe it will be 5 to 10 year process to change the burners, we have changed 2 burners since 2009, 4 months to get a permit to construct for a burner upgrade to Low Nox from AQMD. If you due a simple calculation of say 492 burners per year divided by 60 per year = a minimum of 8 years. There are not enough technical people in the industry and time that it takes to change all of these burners. It will just put companies in a violation situation. Why would we allow this to happen to our economy?

It is interesting we are asking to change burners when there are old ovens, other equipment and the design of the equipment is very inefficient?

We have lost a minimum of 111,000,000 BTUS out of the South Coast Air Basin that come to mind plus many others over the past 10 years.

It is interesting in our last meeting of the workshops before the rule went into effect that the Nox level was set at 20 PPM on ovens and just by asking a question if the burner manufacturers made a 20 PPM burner and both manufacturers said no, the rule was change to 30 PPM right on the spot. For other burners categories that the burner manufactures did not make burners to meet the PPM levels at this point, the rule did not get changed and now the time line has been extended to a future date.

I would recommend getting with the burner manufactures to see if the below are the correct categories that they can make burners for and to what type of burner will meet the PPM requirements. When can they meet the PPM requirements and then implement them into the rule.

Gaseous Fuel Fired Equipment

Asphalt Manufacturing Operation

Afterburners, Degassing Units, Redemption Units, Catalytic Oxidizers, Vapor Incinerator, Crematory, Incinerators, Caliners, Cookers, Roasters, Furnaces, Heated Storage Tanks, Evaporators, Fryers, Heated Immersion Process Tanks, Parts Washers, Conveyorized Spray Power Washers, Metal Heat Treating, Metal Melting Furnaces, Melting Pots, Tar Pots, Kilns, Burn Off Systems, Heating Chamber and Incineration Systems

Cure Ovens, Dry Off Ovens, Dryers, Carpet Dryers, Fabric Dryers, Heat Treat Ovens, Paper Making Dryers, Food Baking Ovens, Textile Production , Grain Drying, Heat Exchangers

Direct Fired Burners for Cooking, Ribbon Type

Heat Paint Spray Booths, Make Up Air Units

Tenter Frame

What is a Other Unit or Process Temperature?

Liquid Fuel Fired Equipment

What is a All Liquid Fuel-Fired Unit?

Thank you for taking the time to review. Please let me know your thoughts or questions.

Jim Waggoner
Industrial Process Equipment Inc.
1700 Industrial Ave.
Norco, Ca. 92860

714 984-4783 Ext. 313

Appendix E, Attachment E-2

Stakeholder Item #11 – Industrial Process Equipment, Inc.

NOTE: **Stakeholder Item #11, Attachment File "25760-1- System Layout PDF.pdf" Was Excluded From This Report Since it Contained Client-Specific Details**

Christina Clark

From: Jim Waggoner <JimW@ipeontime.com>
Sent: Friday, September 02, 2016 2:25 PM
To: christinac@etsi-inc.com
Subject: Emailing: 25760-1- System Layout PDF.pdf
Attachments: 25760-1- System Layout PDF.pdf

Hi Christina, see an attached Conveyorized Powder Coat System which has the following functions to complete the system. Spray Power Washer is in the front then goes to the Dry Off Oven then cools down to the Two Powder Booths and then to the Cure Oven and then to unload.
This is much more than a wash tank, the Spray Power Washer is part of the System.
Have a nice weekend.
Thank you
Jim Waggoner
CEO
Industrial Process Equipment, Inc.
1700 Industrial Ave, Norco, Ca. 92860
Ph (951) 808-9192 Ext 313 Fax (951) 808-9193 Cell (714) 984-4783
e-mail jimw@ipeontime.com

Appendix E, Attachment E-3

Stakeholder Item #12 – Furnace Dynamics, Inc.
(Energy Services Corporation)

ENERGY SERVICES CORPORATION
261A Euclid Avenue
Long Beach, California 90803
Tel: 562-433-3025 Fax: 562-433-9282
AIR QUALITY AND ENERGY EFFICIENCY CONSULTING

Mr. Wayne Barcikowski
Air Quality Specialist
South Air Quality Management District
21865 E. Copley Drive
Diamond Bar, CA 9176530-Oct

RE. Proposed Rule 1147.

Dear Mr. Barcikowski,

The following dialogue will further clarify many of the comments made during the consultation meeting held at the District on October 28, 2008. I feel that even though a large number of relevant issues were discussed a more in depth analysis is required to shape a cogent understanding of the critical elements of the rule and the associative implications to industry. My area of expertise is in the metal melting, heat treating and forging industries.

I represented this industry group during the formation of RECLAIM on 4 separate advisory committees. Over the years I have set up the combustion systems for over 6,500 temperature uniformity surveys in forging and heat treating applications. I have designed the combustion systems for about 100 furnaces in Southern California. We currently design forging and heat treat furnaces that satisfy the needs for product heating and temperature uniformity. I have worked with staff to assist in the rule making process that has yielded an improved understanding from industry to the SCAQMD rule making process and also worked with the SCAQMD to help them understand the technical challenges of industry. Ultimately, the net result was rules that make sense for both the SCAQMD and industry. I have updated and included a paper that I wrote a few years ago discussing the differences in heat treat furnaces as related to BACT. The tenant of the discussion is that an emission level that is applicable to one classification of heat treat furnace is completely inappropriate to other heat treat furnaces. Forge furnaces though more limited in nature in the design and operation compared to heat treat furnaces have the same relevant issues that are affected by this proposed rule. To this end, I present the following for your consideration and reflection.

Issues Relating to Proposed SCAQMD Rule 1147

A number of very serious issues were discussed in the meeting that has significant implications as to how the proposed rule affects certain segments of industry.

RULE LANGUAGE AND CONTENT: The following are issues relating to the specific rule language, intent or relative emissions limit.

1147(C)(1) Table 1 NOx Emission Limit. This table is entirely too broad as related to ***Metal Heat Treating (metal forging)*** and ***Other – Process Temperature > 1200ºF***. Refer to included paper on BACT for Heat Treating Furnaces for insight into the industry and the variety of associated heat treat furnaces. As an example, the same furnace can operate from 800F to 2250F. The emissions at these two ranges can be very different in the same furnace let alone furnaces of significantly different configurations. The staff needs to define the configuration and type of furnace for this to make sense. The *Other – Process Temperature > 1200ºF* category is not acceptable due to the lack of definition. This paints perhaps a very large grouping of equipment with the same brush. That would be like saying a hippopotamus and a giraffe are the same because they are both animals and have four legs. While there may be some equipment in this category the NOx value of 60 ppm may be acceptable, there could be many others where this is not acceptable.

The same is true for the next category requiring 20 ppm. This is again too broad a listing of equipment without specifying which equipment in that category applies. The 30 ppm grouping of equipment suffers from the same inadequacy of the preceding grouping of equipment. As stated above there are many furnaces that operate in a range from 800ºF – 2250ºF, does this mean that the equipment would have to be 30 ppm when operated between 800ºF and 1200ºF and 60 ppm > 1200ºF?

Rule 1147(C)(9) This section should define that if a timer is used the time be connected to reflect only the time of operation of the device, not the total time that electrical power is applied to the device.

Rule 1147(d)(3)(D) the last word should be ***"or"*** not ***"and".***

Rule 1147(d)(3) The section relating to source testing should have a section **(G)** added to allow EPA Method 19 "F" factor calculations where the device being tested does not possess a traditional flue that could utilize the previous indicated test methods.

Another section should be added that specifies that if an existing combustion system satisfies the applicable requirement, that compliance may be satisfied by a source test pursuant to one of the provisions under (d)(3)(A)-(G)

1147(g) Exemptions. There needs to be an added exemption placed in this section pursuant to the inability of combustion company manufacturers to guarantee compliance with the NOx levels and temperature uniformity surveys required by aerospace specification such as AMS 2750D. This is addressed in detail in the body of this discussion.

Comments Relating to the Preliminary Draft Staff Report

Page 1-3 Technology Assessment, Low NOx Burner Technology, paragraph 4: In the comments relating to the use of staged combustion where there is a fuel rich zone and a lean zone, it is not mentioned that this type of burner requires the chamber temperature to exceed 1600°F to function. Therefore use on a lower temperature furnace could be ineffectual and not achieve the desired NOx reduction. Another issue is the fact that these burners, by their nature are considered a "normal" velocity burner. Whereas this technology could be used in some applications they would not provide adequate temperature uniformity surveys if placed in a furnace where compliance with AMS 2750D was required. Many of these applications require high velocity burners to maintain the required uniformity. After any modification a new temperature uniformity survey is required. If this survey fails, the furnace must be shut down. The company cannot use the furnace for processing forgings and heat treated parts.

Page 1-4 Technology Assessment, Low NOx Burner Technology, paragraph 6: This paragraph addresses the use of excess air to reduce NOx. Whereas, this methodology does reduce NOx by reducing hot mix temperature, its primary purpose in heat treating and forging is to improve temperature uniformity at lower operating temperatures. The last sentence in this paragraph is fundamentally incorrect. By virtue of the fact that excess air is used, the loss of efficiency cannot be adjusted out without loss of efficiency or increase in fuel consumption. Refer to North American Combustion Handbook Volume 2, Available Heat chart for technical analysis. This shows how the available heat diminishes when operating at a specific furnace temperature and a specific amount of excess air.

Attached you can find 2 examples the Department of Energy Process Heating Assessment & Survey Tool (PHAST 2.0). This is a software tool utilized to analyze projects. The calculator section shows the differences in excess air and ratio firing. Also please find two printouts showing the differences in efficiency by using 2% O2 (10% excess air) vs. 11% O2 (100% excess air) for a heat treat application where the fuel savings would be 46.6%. Also included is a forging application where differences in efficiency at 2% O2 vs. 7.5% O2 yielded a savings of 42.3%.

Whereas, the statements associated with turndown have some efficacy for some applications. Those associated with forging and heat treating face far greater challenges. This is due to varying load factors and temperature ranges of operation. The forging ranges for these furnaces range from 800F to 2250F. They are operated in an excess air mode at the lower temperatures but on ratio at higher temperatures. Since these companies are job shops, their furnace loads vary. A given furnace might have a load of 3,000 lbs. on one day and 15,000 lbs on a subsequent day. It is not unusual for a furnace to operate at multiple temperatures on any given day. Virtually all the burners used in forging and heat treating industries increase in NOx emissions as the burners turn down. NOx levels also increase as the operating temperature increases. For example, according to the data sheet an Eclipse ThermJet 100 burner at high fire generates 35 ppm, at 35% approximately 60 ppm, at 20% it generates about 80 ppm. By any measure this is a good low NOx burner. By the way the rule is written, this burner could only be operated when at a reasonably high firing rate and still maintain compliance with the rule. Yet the pounds per hour values (see the write up later in this dialogue) are much less at turndown than at high fire. Thus the actual emissions are lower. The purpose of this rule is to reduce emissions. This burner could do that but could be used in only a few applications. Staff needs to alter the compliance methodology to include pounds per hour as an alternative method assurance of emissions reduction.

Comments relating to the consultation meeting held at the SCAQMD October 28, 2008.

TECHNOLOGY TRANSFER: This topic was presented and discussed at length in our meeting. There has been a general feeling that when a combustion system manufacturer comes up with a new low NOx burner that works in a specific application, it can be utilized in a significant number of other applications with uniform success. Unfortunately this is not possible. The comments by the two burner manufacturer's representatives very well articulated this point. Due to the disparate nature of furnaces, sizes, firing rates, temperature ranges, operating conditions, etc. the utilization of a burner in one furnace may not be applicable on another furnace even within the same general usage category.

By reviewing the included paper "BACT Considerations of Heat Treat Furnaces" one will gain an appreciation of the inability of using a specific burner for one furnace vs. another in the same category. The same issues are relevant in the forging industry and metal melting industries. In forging, for example, operating temperatures range from 800ºF to 2300ºF in many cases within the same furnaces. There are box furnaces, rotary hearth furnaces, slot forge furnaces, low temperature recirculating furnaces and the list goes on. Furnace sizes and configurations vary vastly depending upon the job for which they were designed. These furnaces operate in the excess air mode, ratio mode and pulse firing mode of operation. There are standard velocity and high velocity burners that are designed to provide a particular heating pattern in the furnace proper. The paper on heat treat furnaces addresses the issues of temperature uniformity. Most of the forge furnaces in Southern California are certified to forge aerospace components and critical commercial forgings. These components ultimately go into a variety of aircraft, engines, structure or various control systems. Twice a year each of these furnaces must pass customer required uniformity survey to either +/- 20ºF or +/- 25ºF. If the furnaces do not pass these surveys the furnaces must be shut down and cannot be used for forging of any aerospace components.

The issue came up that there were furnaces within a particular broad based classification that have passed source tests. Whereas this is true, those same burners may not yield the same results in other furnace configurations.

Temperature Uniformity vs. NOx vs. Manufacturer Guarantee: This issue was discussed at some length. These furnaces were designed to do a particular job and have been successful for many years. The question comes up regarding the use of a particular burner on a specific furnace that was not intended to use that burner. Two manufacturer's representatives were present one from Eclipse Combustion and the other from Maxon. When asked if they would not only guarantee the NOx values but successful temperature uniformity survey they both indicated that they could not. We believe this would be true of the other major manufacturers. The primary problem is trying to apply a burner design to a furnace that it was not designed to operate in. For instance, Eclipse has a low NOx burner that is designed to operate on higher temperature furnaces. It is a staged air type of burner. The primary combustion portion of the burner generates a fuel rich flame. That flame then combines with the bypassed air injected into the furnace through additional ports in the burner. If the furnace temperature is too low < 1600ºF the recombining of the gasses cannot take place and the burner will not function properly. Thus the manufacturer would not guarantee the burner performance. Bear in mind that most of these furnaces operate over a wide variety of temperature ranges.

As was mentioned above, a specific burner cannot be used in all operations. Manufacturers have only a limited number of burner configurations that can satisfy the needs of a very large variety of furnace configurations. Due to the overall market for these low NOx burners, manufacturers allocate a specific amount of resources for R & D relating to low NOx burners due to the relatively limited market for these products. Even then the range of available equipment is somewhat limited.

The other issue with this and other low NOx burners is that the burners are a normal velocity design. That means that temperature uniformity can be compromised. If this happens the furnace will not pass a uniformity survey, the furnace must be shut down and not operated for forging any parts requiring these surveys. The bulk of forging activity in Southern California is aerospace and critical commercial forgings also requiring these surveys.

SAE-AMS-2750D Aerospace Material Specification: This is the specification that covers virtually all aerospace forging and heat treating in Southern California. Whereas there are other specifications such as AMS – 6875 Heat Treatment of Steels et al that cover heat treatment of titanium and other alloys, AMS – 2750D is the major specification controlling forging and heat treating. This is a 46 page document with high degrees of specificity on a plethora of items relating to the heat processing of aerospace alloys. To improve understanding of the critical nature of this specification we have included a few sections that relate to scope (1.1), equipment modification (section 3.5.3) and temperature uniformity survey failures (section 3.5.19.1).

1.1 This specification covers pyrometric requirements for thermal processing equipment used for heat treatment. It covers temperature sensors, instrumentation, thermal processing equipment, system accuracy tests, and temperature uniformity surveys. These are necessary to ensure that parts or raw materials are heat treated in accordance with the applicable specification(s).

3.5.3 Furnace Modifications: An initial TUS (temperature uniformity survey) shall also be performed after any furnace modification or adjustment that could have altered the temperature uniformity characteristics of the furnace. Examples where an initial TUS shall be required include, but are not limited to the following:

- *Increase in the maximum qualified operation temperature or the decrease in the minimum qualified operating temperature*
- *Burner size, number, type, or location change*
- *Changes to air flow pattern/velocity*
- *Change to refractory thickness*
- *New refractory with different thermal properties*

- *Change in control sensor location*
- *Change in combustion pressure settings from the original setting*
- *Temperature control scheme change (proportional versus high-low/off-onn)*
- *Adjustment to tuning constants*
- *Work zone volume increase covering area not previously tested*
- *Work zone location change covered area not previously tested*

There are a few other items that cover electrically heated furnaces that were not included. The last section (3.5.19) for reference is the one that addresses TUS failures. See the following:

3.5.19.1 If the temperature uniformity is not within the tolerances of Table 8 or 9 (parts and raw material furnace classification based on furnace class), the cause of the deviation shall be determined and documented and the requirements of 4.2 shall apply. The equipment shall not be used for additional processing until the cause has been corrected and the TUS has been performed successfully.

4.2 In the event of any test failure or out of tolerance condition, an evaluation of the possible effects of the non-conformance on product processed since the last successful corresponding test shall be performed and documented. The evaluation shall be documented per established material review procedures; appropriate corrective action shall be taken, documented and maintained on file. When material processing conditions deviate from specification requirements affected purchaser(s) shall be notified.

In essence AMS – 2750D controls all aspects of how a furnace is operated. If a TUS is not successful after a modification to the furnace as indicated in 3.5.3 the furnace cannot be used for forging and heat treating aerospace parts.

Therefore, without manufacturers guarantee of both NOx and successful uniformity surveys, the companies would be reluctant to purchase a burner that could put them out of business. This could constitute a taking of property.

Recommendation: *We would recommend that staff needs to rethink their position that the same burners can universally be used on a wide range of applications without any actual testing on specific furnace configurations. Further, without manufacturer's guarantees these classifications should not be considered in the rule structure at this time. Perhaps with more in depth analysis by industry, the*

SCAQMD and manufacturers in a subsequent rule could generate a rule that is more specific in nature and that would not potentially put companies out of business. We would be willing to assist in this effort. Unfortunately, due to the time constraints posed by the presentation to the Governing Board, a significant amount of unresolved technical issues are yet to be resolved. Further exacerbating the issue is the problem that in some of these categories even years downstream, burners that a manufacturer would guarantee to meet both emissions levels and uniformity requirements may still not be available. As has been indicated the South Coast Air Basin represents a very small percentage of the total market for combustion equipment. Prior to invoking a rule as extensive as PR 1147, manufacturers must have the equipment available, tested and guaranteed for each specific application.

BACT vs. Furnace Configuration: As was discussed in the heat treat furnace paper, BACT could vary for different furnace configurations. Some furnaces may lend themselves to relatively easy source testing while others would create significant problems. For instance, slot forge furnaces. They do not have any physical flues and have open slots. There are no doors due the nature of the furnace configuration and the way they forge parts. Due to this configuration there is some air infiltration, NOx values are affected by this infiltration. To our knowledge there are no low NOx burners that have been successfully used on this furnace configuration and in talking to the manufacturers; they would not guarantee results in combination with acceptable uniformity surveys.

Recommendation: *When combustion equipment manufacturers will not guarantee Rule compliance results from a NOx value AND successful temperature uniformity surveys in these critical heat treat and forging industries, the District should not include those industries in this proposed rule. Thus these and many other types of furnaces with similar issues should be dealt with at a future date when and only if technology is available that would allow the manufacturers to guarantee NOx and uniformity surveys.*

Compliance Dates: An issue also addressed at the meeting was compliance dates. There are a number of companies; one which was represented at the meeting, that has a significant number of furnaces. To require all of these to be retrofitted by a certain date would represent a severe economic burden, particularly in slow economic times.

Recommendation: *In this case it would be recommended that extending the compliance dates over a period of years would be a reasonable approach. The intent would be achieved without the company* *incurring financial peril. The rule might be tied into the overall cost of the projects or a quantity specific retrofits that would be required per year.*

Cost Effectiveness: This area is one that came under discussion that deserves due consideration particularly due to the size of many of these units. The district has indicated a cost effectiveness of $6,000 - $13,000 per ton emitted. If the District believes these are the general rule that could be a consideration, however, for the very small sources that emit extremely small daily, weekly or annual emissions, the cost could be extremely high relative to the net benefit to the environment. We feel that in these few cases the typical BACT guidelines cost effectiveness should apply. Bear in mind that these sources are typically on the very small end of the emissions scale. For the smallest sources included in this rule the device may only produce 50 or so pounds/year. Going from 90 ppm to 30 ppm reduces this to about 18 pounds/year. It is conceivable that the Districts DCF (discounted cash flow) cost to control could be $30,000/ton to perhaps $200,000/ton depending upon the application. Two examples are included.

Recommendation: *The staff should consider the cost/benefit relationship in these few isolated cases. This consideration should be placed in the rule rather than requiring these companies to go through the further expense of getting an attorney to represent them in a hearing board for a variance. This is particularly true due the minimal emissions generated and thus reduced.*

Pounds/Hour vs. ppm: Most burners that could be utilized in metallurgical operations are medium or high velocity burners. The exit velocity can be as high as 300 mile per hour. This very high velocity induces an in-furnace recirculation of products of combustion. The result is a lowering of NOx emissions at the maximum firing rate of the furnace proper. As the firing rate is reduced the NOx levels in ppm tend to go up due the reduced exit velocity of the products of combustion. However they go up at a lower rate than the relative reduced energy input. Thus at maximum firing rate the total emissions entering the atmosphere are higher than the emissions generated at a lower firing rate, even though the ppm values have risen. For instance an Eclipse ThermJet TJ100 burner (1MMBTU/hr capacity) emits an estimated 35 ppm, however as the firing rate decreases, the NOx levels go up, as an example, at approximately 35% firing rate (350,000 BTU/hr) the NOx levels are about 60 ppm. At lesser percentages of the maximum firing rates the NOx levels are actually higher. The result is actually lower NOx into the atmosphere.

The following is a very important note that accompanies the charts in the Eclipse data sheets. This statement is indicative of all manufacturers and what they will guarantee for a particular application. The charts are a general guide. The actual conditions under which a particular burner is used dictates the actual NOx values. The Eclipse data sheet states:

"Emissions from the burner are influenced by:

1. *Fuel type*
2. *Combustion air temperature*
3. *Firing rate*
4. *Chamber conditions*
5. *Percent of excess air"*

As a general rule, as the chamber temperature increases the NOx levels go up. A furnace operating at 1600ºF will generate considerably lower NOx than the same furnace operating at 2200ºF. With that in mind, let us review the example below that shows the pounds per hour of emissions into the atmosphere vs. the firing rate and ppm values. The actual NOx value for a given furnace would still fall on what the manufacturer is willing to guarantee at a specific furnace operating condition for that process. Thus with the same burner Eclipse (or any other manufacturer) would guarantee a higher NOx level for a high temp forge furnace than a lower temperature furnace using the same burners. Again one size and one burner do not have the same characteristics in multiple applications.

Observe:

20% firing rate = 80 ppm = 102.6 lbs / MMcf

35% firing rate = 60 ppm = 76.9 lbs / MMcf

100% firing rate = 35 ppm = 44.9 lbs / MMcf

100% firing rate = 1,000,000 BTU/hr /1020 BTU/cf = 980 cf/hr.

35% firing rate = 350,000 BTU/hr / 1020 BTU/cf = 343 cf/hr

20% firing rate = 200,000 BTU/hr / 1020 BTU/cf = 196 cf/hr

Therefore:

At 100% firing rate NOx emission are: (980 / 1,000,000 cf) x 44.9 = **.044 pounds of NOx per hour**

At 35% firing rate NOx emissions are: (343 / 1,000,000 cf) x 76.9 = **.026 pounds of NOx per hour**

At 20% firing rate NOx emissions are: (196 / 1,000,000 cf) x 102.6 = **.020 pounds of NOx per hour**

In the above example, it is readily seen that even with the lower firing rate and higher ppm values the emissions entering the atmosphere are actually considerably lower.

Recommendation: *We therefore propose that the District use a pound per hour basis for determining compliance. This would be based on the pounds per hour emitted at 100% for a given burner or classification of equipment. Therefore the pounds per hour for that device will never exceed the emissions rate of the equipment operated at 100% firing rate. The intent of the rule is met, the flexibility is established and at no time would the emissions exceed the maximum atmospheric emissions of maximum firing rate. The SCAQMDs main concern should be the total pounds of NOx entering the atmosphere. Using ppm is only a part of the picture.*

Conclusion: This proposed Rule 1147 has a multitude of problems on a technical basis. There are so many unresolved problems that it is recommended that further input from knowledgeable industry representatives and burner manufacturers be further consulted prior to submittal to the Governing Board. This would result in a much improved rule for the District and industry. Currently the proposed rule is heavily flawed. It serves no purpose to proceed with a rule that is unworkable for various segments of industry. The only alternative would be to exempt various segments of industry from this rule where manufacturers are not willing or able to guarantee NOx emissions results AND temperature uniformity surveys. Failed uniformity surveys put these companies out of business.

We have included some reference material for your consideration and evaluation. We believe this material supports the various presented statements above. Should you wish some additional information that relates to the above dialogue, we can provide whatever additional information will be helpful in assisting your increased knowledge base of our industry.

As always, we stand ready to assist the SCAQMD in their efforts to clean up the air in the SCAB. Rules to be effective must be well thought out. The breath of this rule demands high degrees of technical acuity by those developing the rule. Too much technical work remains for this to be deemed an acceptable rule.

Sincerely,

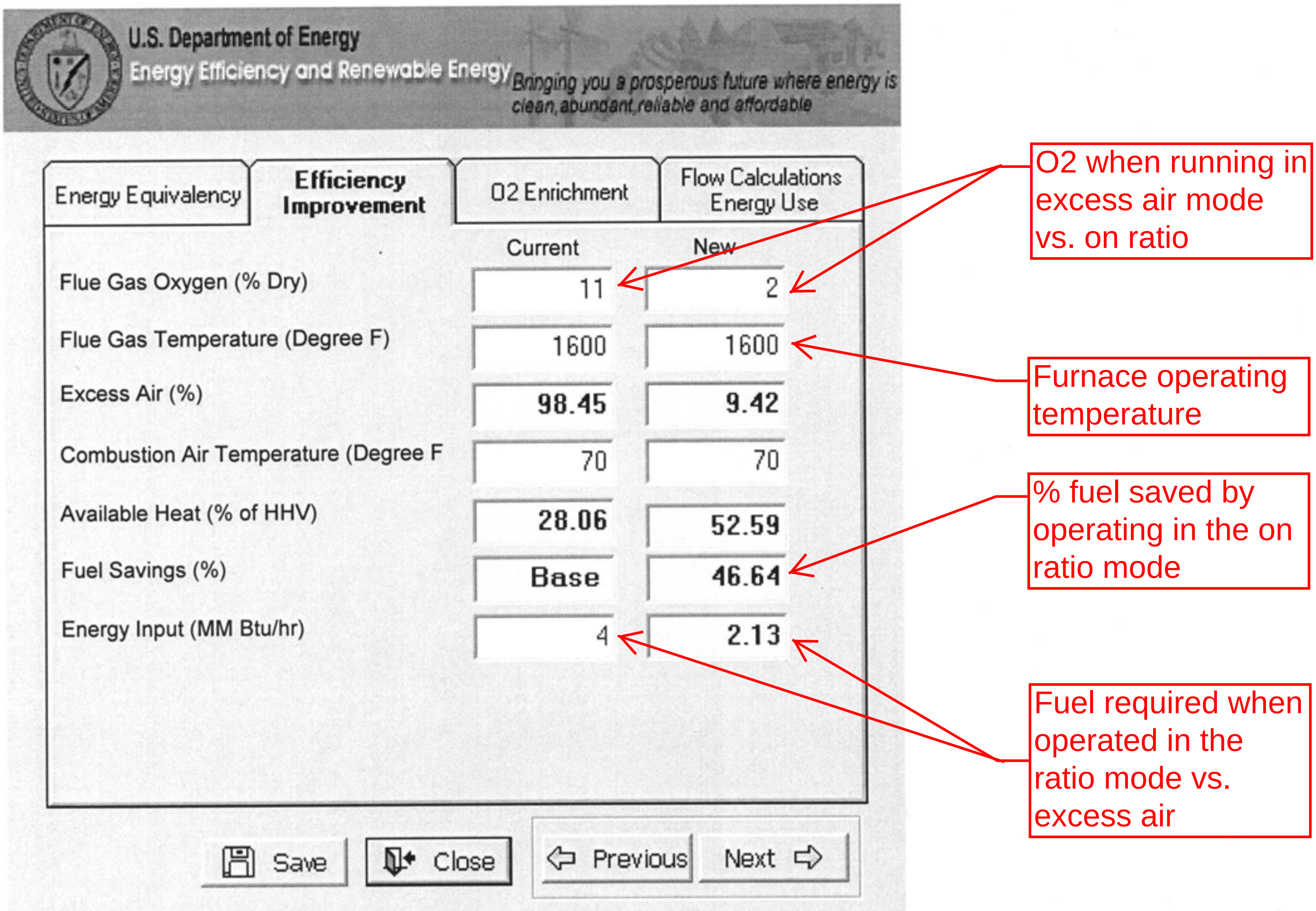
Anthony W. Endres

President

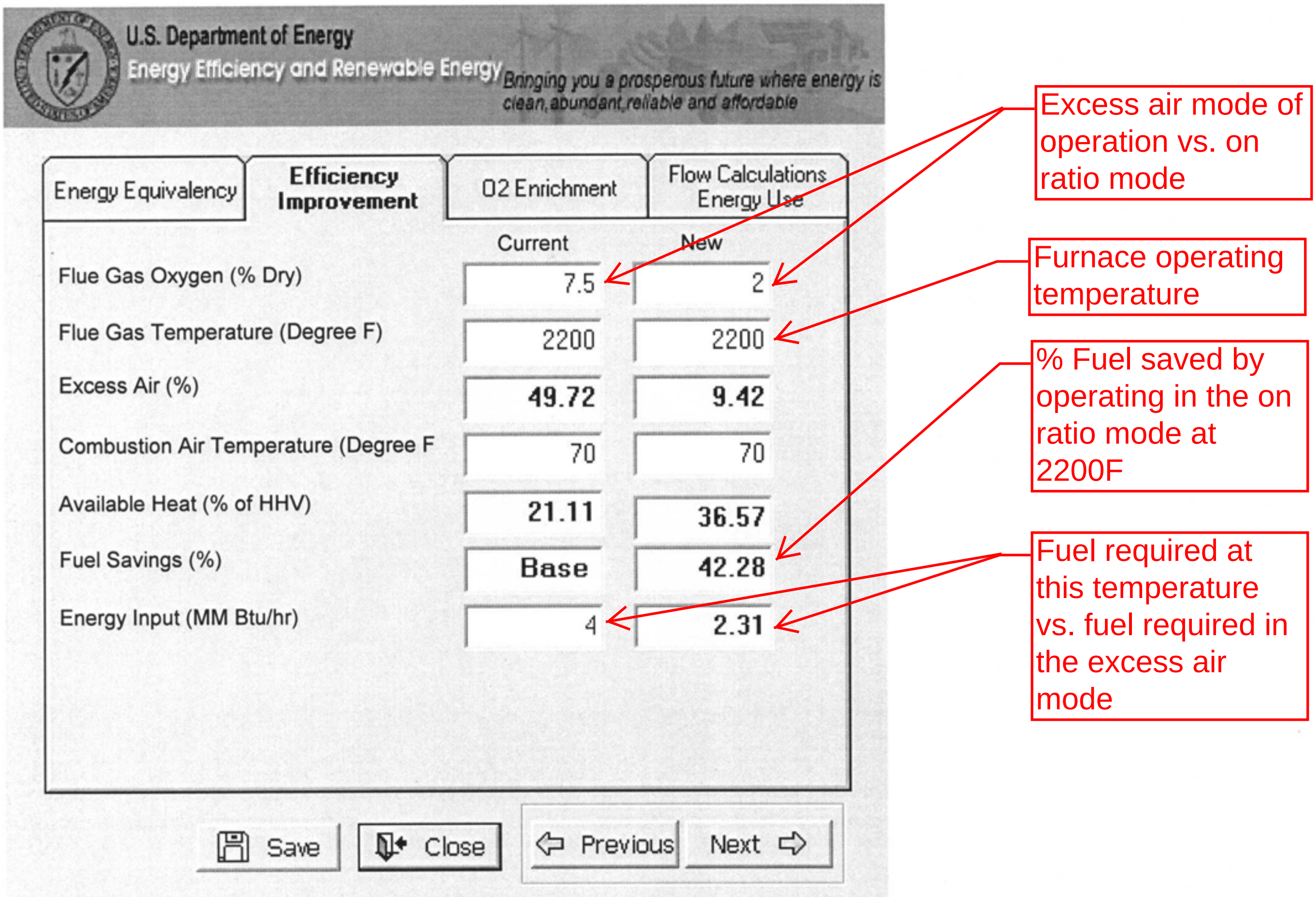
Enc.

REFERENCE MATERIAL

1. DOE Calculator section showing a typical heat treat application. The comparison shows the relationship of efficiency when operating on excess air vs. ratio when operating the furnace at 1600°F.
2. DOE Calculator section showing a typical forging application. This comparison shows an excess air vs. ratio when operating a furnace at 2200°F.
3. Cost effectiveness calculation showing a typical forging application. All the formulas are those used for BACT Cost Effectiveness Evaluation presented in District publications.
4. Cost effectiveness calculation showing a typical soil remediation application. All the formulas are those used for BACT Cost Effectiveness Evaluation presented in District publications.
5. Eclipse ThermJet Model TJ0100 Data Sheet. Page 2 shows the NOx values at different firing rates.
6. Paper "BACT Considerations of Heat Treat Furnaces" that articulates the differences in configuration of heat treat furnaces.



Heat Treat Furnace Operation
Typical Heat Treat Operation



Forge Furnace Operation
Typical High Temperature operation

COST EFFECTIVENESS CALCULATION

Type of Project	**Forge Furnace**	
Use		
Hours per Day	16	
Days per Week	5	
Weeks per Year	50	
Annual Hours of Use	4000	Hours
Gross Input BTU/hr	4,000,000	BTU/hr
Average Input (%)	40%	% Input
Average BTU Input	1,600,000	BTU/hr
Starting Emissions	80	ppm
Pounds/MMCF	102.56	#/MMCF
Pounds per Hour	0.156	
Annual Emissions	**625**	**# Nox/Year**
Modified Source Emissions		
Average Input (%)	40%	% Input
Average BTU Input	1,600,000	
Starting Emissions	60	ppm
Pounds/MMCF	76.92	#/MMCF
Pounds per Hour	0.117	
Annual Emissions	469	# Nox/Year
Annual Reduced Emissions	**156**	**# NOx/year**
Annual Tons Reduced	0.078	T/Y Reduced
10 Year Emissions Reduction	0.781	
Equipment Costs		
Burners	$ 5,000	
Engineering	$ 1,000	
Piping Costs	$ 1,000	
Installation Costs	$ 800	
Refractory Cost	$ 500	
Start Up Costs	$ 300	
Loss of production	$ 5,000	
Gas Meter & Gages	$ 3,000	
Permit to Construct Fee	$ 2,051	
Source Test	$ 2,200	
Equipment Cost	**$ 20,851**	
Annual Costs		
Surveys 2 per year	$ 1,000	per year
Periodic Maintenance	$ 500	per year
Source Test 5 years	$ 2,500	once every 5 years
Cost 10 Year Cost	$ 15,250	
Annual Cost (10 year average)	**$ 1,525**	
DCF Cost Per Ton Reduced	**$ 42,510**	

COST EFFECTIVENESS CALCULATION

Type of Project	**Soil Remediation**		
Use			
Hours per Day		24	
Days per Week		7	
Weeks per Year		50	
Annual Hours of Use		8400	Hours
Gross Input BTU/hr		150,000	BTU/hr
Average Input (%)		40%	% Input
Average BTU Input		60,000	BTU/hr
Starting Emissions		90	ppm
Pounds/MMCF		115.38	#/MMCF
Pounds per Hour		0.007	
Annual Emissions		**55**	**# Nox/Year**
Modified Source Emissions			
Average Input (%)		40%	% Input
Average BTU Input		60,000	
Starting Emissions		30	ppm
Pounds/MMCF		38.46	#/MMCF
Pounds per Hour		0.002	
Annual Emissions		18	# Nox/Year
Annual Reduced Emissions		**37**	**# NOx/year**
Annual Tons Reduced		0.018	T/Y Reduced
10 Year Emissions Reduction		0.185	
Equipment Costs			
Burners	$	2,000	
Engineering	$	500	
Piping Costs	$	250	
Installation Costs	$	500	
Refractory Cost	$	250	
Start Up Costs	$	300	
Loss of production	$	-	
Gas Meter & Gages	$	2,500	
Permit to Construct Fee	$	2,051	
Source Test	$	2,200	
Equipment Cost	**$**	**10,551**	
Annual Costs			
Periodic Maintenance	$	500	per year
Source Test 5 years	$	2,500	once every 5 years
Cost 10 Year Cost	$	5,250	
Annual Cost (10 year average)	**$**	**525**	
DCF Cost Per Ton Reduced	**$**	**80,214**	

Eclipse Combustion

ThermJet Burners

Model TJ0100

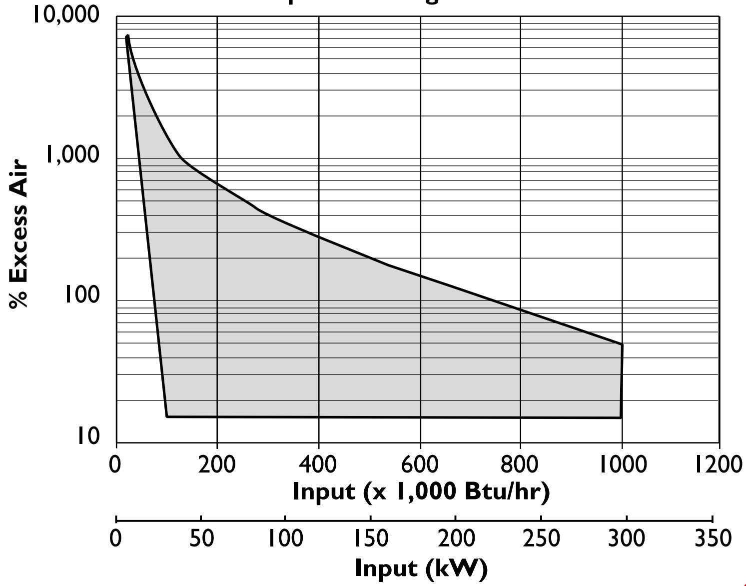
Version 2

PARAMETER	BURNER VELOCITY		MODEL TJ0100
Maximum input Btu/hr (kW)	Medium & High Velocity		1,000,000 (293)
Minimum Input, on-ratio Btu/hr (kW)	Medium & High Velocity		100,000 (29)
Minimum Input, fixed air Btu/hr (kW)	Medium & High Velocity		20,000 (6)
Gas inlet pressure required "w.c. (mbar) • Fuel pressure at gas inlet (Tap "B"– see page 3)	High Velocity	Nat. Gas Propane Butane	12.5 (31.0) 13.5 (34.0) 14.5 (36.0)
	Medium Velocity	Nat. Gas Propane Butane	5.5 (14.0) 8.0 (20.0) 7.5 (19.0)
Air inlet pressure required "w.c (mbar) • 15% excess air at maximum input (Tap "A" – see page 3)	High Velocity	Nat. Gas Propane Butane	16.5 (41.0) 17.0 (43.0) 17.0 (43.0)
	Medium Velocity	Nat. Gas Propane Butane	9.0 (23.0) 9.0 (23.0) 9.0 (23.0)
High Fire Flame Length Inches (mm) (measured from end of combustor)	High Velocity	Nat. Gas Propane Butane	33 (835) 34 (865) 35 (890)
	Medium Velocity	Nat. Gas Propane Butane	38 (965) 37 (940) 42 (1065)
Maximum flame velocity ft/s (m/s) • 15% excess air, at maximum input	High Velocity Medium Velocity		500 (152.4) 250 (76.2)
Flame detection	U.V. scanner available for all combustors Flame Rod available for use with alloy or silicon carbide combustors only		
Fuel	Natural Gas, Propane, Butane *For any other mixed gas, contact Eclipse for orifice sizing.*		

- All information is based on laboratory testing in neutral (0.0"w.c.) pressure chamber. Different chamber size and conditions may affect the data.
- All information is based on standard combustor design. Changes in the combustor will alter performance and pressures.
- All inputs based upon gross caloric values.
- Eclipse reserves the right to change the construction and/or configuration of our products at any time without being obliged to adjust earlier supplies accordingly.
- Plumbing of air and gas will affect accuracy of orifice readings. All information is based on generally acceptable air and gas piping practices.

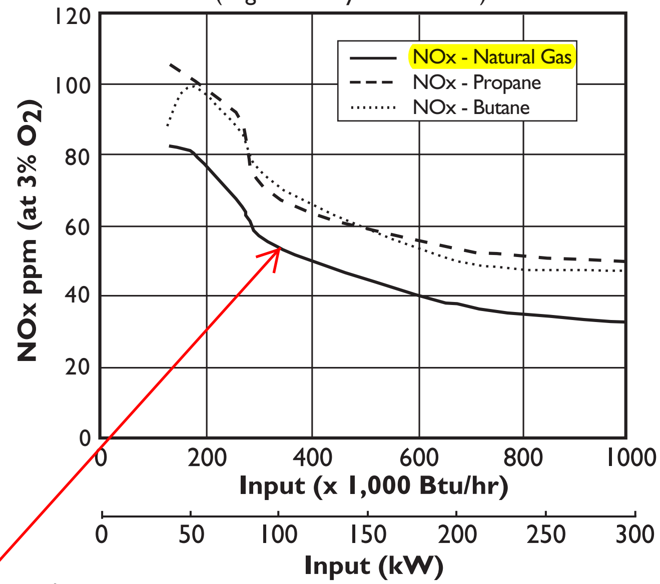
Performance Graphs

Operational/Ignition Zone



NO_x Emissions

(High Velocity Combustor)



Correction factor for medium velocity combustor is 1.20

On Ratio: Combustion air is adjusted to 3% O_2 at any given input.

Approximate NOx emissions at different firing rates. Note that the operating conditions effect the actual emissions of an application

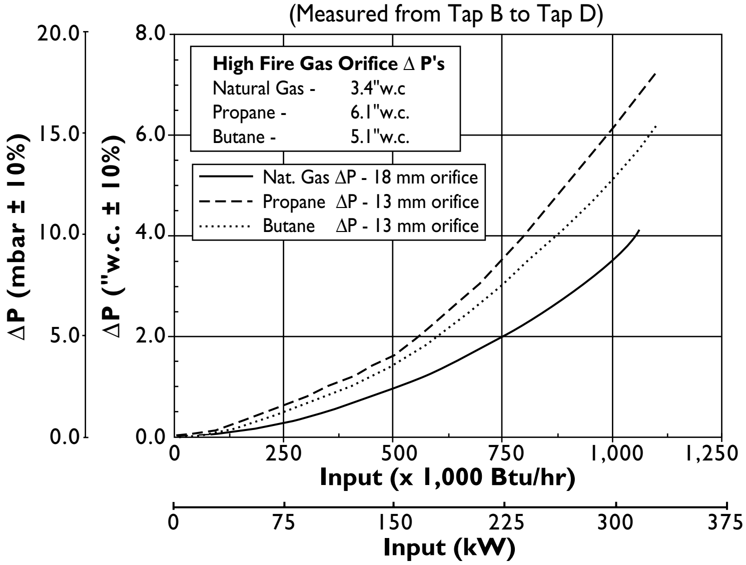
Emissions from the burner are influenced by:

- fuel type
- combustion air temperature
- firing rate
- chamber conditions
- percent of excess air

For estimates of other emissions, contact Eclipse Combustion.

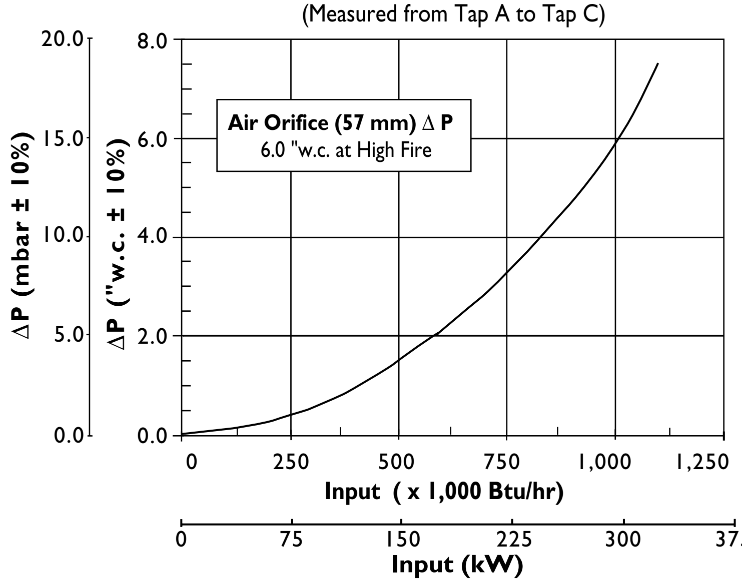
Gas Orifice Δ P vs. Input

(Measured from Tap B to Tap D)



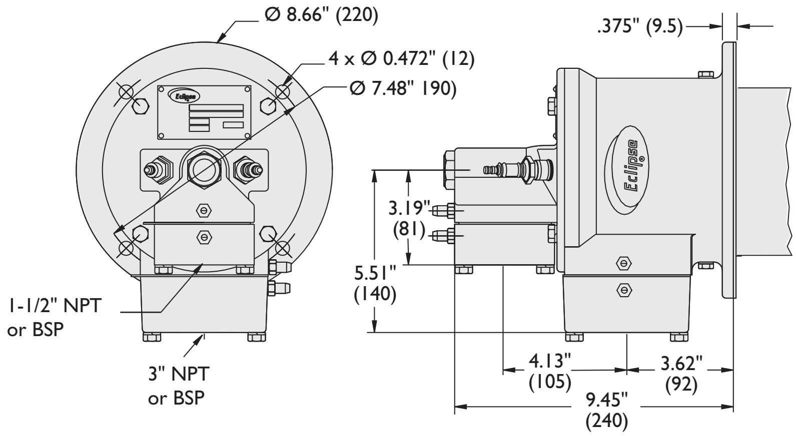
Air Orifice Δ P vs. Input

(Measured from Tap A to Tap C)



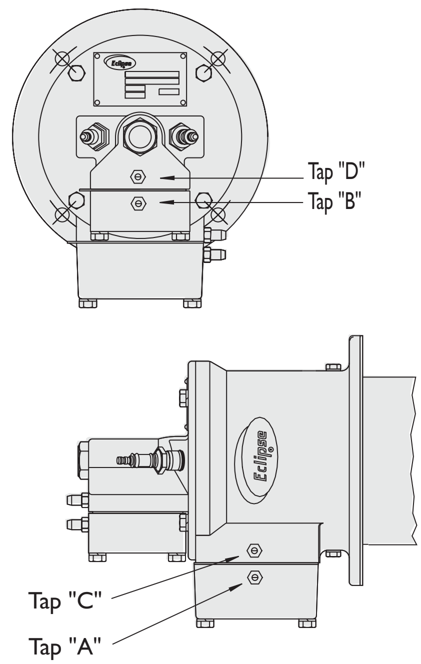
Dimensions & Specifications
Inches (mm)

Burner Housing



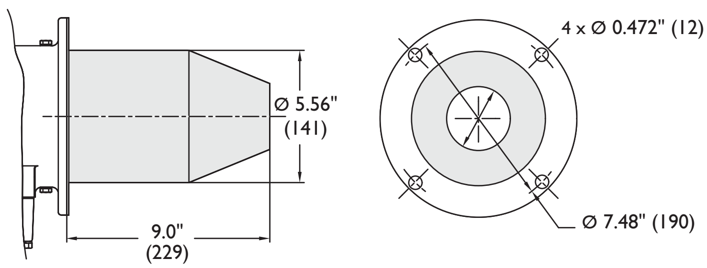
Burner weight less combustor: 42 lb (19 kg)

Tap Locations



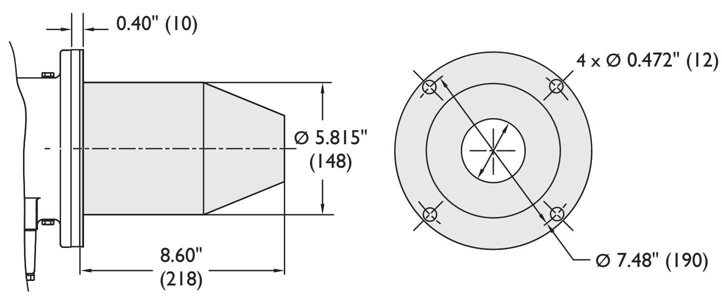
Combustor

Exhaust outlet diameter : High Velocity : Ø 2.125 (54)
Medium Velocity : Ø 3.0" (76.4)



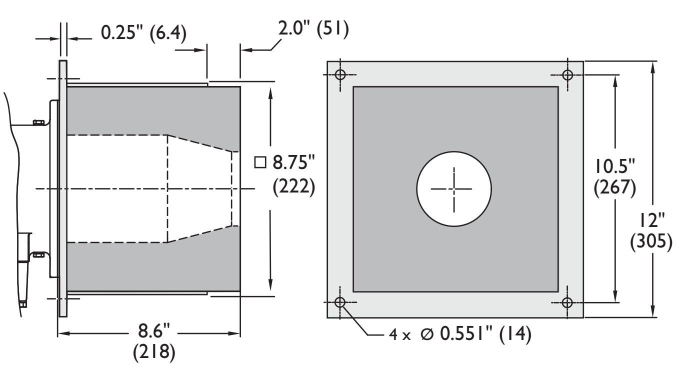
Alloy Tube (AISI 310)

Weight: 3.2 lb (1.45 kg)
Max Chamber Temp: 1,750°F (950°C)



Silicon Carbide Tube

Weight: 3.2 lb (1.45 kg)
Max Chamber Temp: 2,500°F (1371°C)



Refractory Block (w/RA330 wrapper)

Weight: 61.3 lb (28 kg)
Max Chamber Temp: 2,800°F (1538°C)

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Long Beach, California 90803
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AIR QUALITY AND ENERGY EFFICIENCY CONSULTING

BACT CONSIDERATIONS OF HEAT TREAT FURNACES

Heat Treat Companies in Southern California: There are a large number of companies that heat treat products in Southern California. Different heat treat companies have specific metallurgical requirements specified by their customers. Some specialize in only aluminum; while others heat treat small fasteners, yet others concentrate on aerospace alloys. Different furnace designs and methods of firing are required to satisfy those needs. Further, many heat treat companies specialize in very narrow ranges of heat treat capabilities and therefore design custom furnaces that satisfy that requirement. It is not unusual for companies to have one-of-a-kind (proprietary) furnaces used in only one plant.

Temperature Uniformity: This term is mentioned in the dialogue above. This is critical to all types of heat treat equipment. The companies who operate these types of furnaces must pass a temperature uniformity survey, typically twice a year at the representative temperatures that the furnaces operate. The uniformity requirements are spelled out in AMS 2750D, AMS H-6875 as well as many other specifications that regulate the industry for aerospace materials and commercial heat treating. Typically the uniformity requirements are dependent upon furnace class and temperature range. For lower temperatures the limit is +/- 10^{o}F, as the temperatures increase the limit is +/- 15^{o}F, the upper limits are +/- 20^{o}F or +/- 25^{o}F depending upon the specification. A uniformity survey is setup to measure how uniform the temperature is within the working envelope of the furnace. The temperature is measured by placing stands inside the furnace and attaching thermocouples at the representative levels in the furnace. The minimum number of thermocouples is 9 and the maximum is 44, depending on a formula spelled out in the heat treat specification relative to volume of the work zone.

The customers define which specification they must comply. The requirements are very stringent. If a furnace does not pass a uniformity survey they must shut down the furnace and not operate it for heat treating. The heat treaters are audited to assure compliance with the uniformity standards as well as calibration of instruments, etc. Should they not be able to comply with the requirements they are essentially out of business.

BACT guidelines require that to achieve a BACT classification the technology must be specific to a particular type of furnace observed as being continuously successfully operated for a period of 12 months. Once this criterion has been established for a specific type of furnace, the BACT classification remains intact for a period of 2 years.

Objective: To provide an understanding of the differentiation of types of heat treat furnaces as associated with BACT requirements. To this end, this paper will define both the basic different types of the heat treat processes as well as the associative furnaces to satisfy the vastly different requirements of the heat treat industry. Furnaces are designed to accomplish a specific task with a specific combustion system. The physical size, configuration and method of firing are all taken into consideration in the engineering phase of the design process. It must be understood that there is no one NOx emission limit that can be ascribed to the industry as a whole or for a specific temperature range or type of furnace within that type. BACT is a condition specific rule.

Background: To accurately determine the appropriate BACT for a type or classification of equipment, it is important that one completely understand the depth and breathe of said equipment. It is also important that the "achieved in practice" criteria be established for the specific application rather than an industry as a whole. This is particularly true of heat treating furnaces. The general classification is very expansive in differences of configuration and cannot be painted with the broad brush for all furnaces within that industry. There can be significantly different configurations within the same operating temperature range. It is impossible to determine the appropriate BACT by only looking at heat treating as a single category. There are a large variety of heat treat furnaces. The two basic types are ***direct firing*** and ***indirect firing***. Each of the different types has specific uses and can have dramatically different physical characteristics, combustion systems, furnace temperature, and burner types. This dialogue will articulate the differences in hopes of clarifying the differences.

Direct Firing is a process where the products of combustion are in contact with the parts to be heat treated. The materials heat treated in these furnaces are aluminum and carbon steel (where further processing such as machining is required), stainless steels, exotic aerospace alloys, etc. Temperature ranges are typically from 400°F to 2,100°F. Within this category there are a variety of significantly different types of furnaces that satisfy specific metallurgical requirements. The processes are homogenizing (for aluminum), hardening and annealing processes for other alloys. Some of these are air quenched, liquid quenched or slow cooled, depending upon the process.

Indirect Firing is used where a controlled atmosphere is required. This atmosphere is an inert gas, which will maintain a non-oxidized surface. There are both high temperature and low temperature applications. Alloys run from the aluminum to exotic alloys (aerospace grades) and carbon steel.

Aluminum alloys must be protected from contact with product of combustion to maintain their bright finish, typical of parts already machined and ready for installation in final assemblies. Temperatures are usually less than 1,000°F and are generally for homogenizing to relax the grain structure after casting or coiling but can also include hardening where rapid quenching is required.

Steel is also annealed much in the same manner as aluminum but the furnaces operate at higher temperatures – up to 1,600°F. There are also indirect fired strip annealing, a continuous process where long coils of stainless or non-ferrous steels are passed through long vertical or horizontal furnaces. These furnaces are very constant in firing rate and run for long periods without being shut down.

As indicated above, within each of the two major categories are sub categories that describe the different furnace configurations; burners and combustions unique to these sub categories.

1. Direct Fired
    a. Low Temperature Recirculating
    b. Medium Temperature Recirculating
    c. High Temperature Direct Fired (ratio, excess air & pulse)

2. Indirect Fired
    a. Low Temperature Recirculating (radiant tube, atmosphere)
    b. Medium Temperature Recirculating (bell annealing, atmosphere)
    c. High Temperature Vacuum (gas and electric)
    d. High Temperature, silicone or ceramic tube type
    e. Strip Annealing
    f. Wire Annealing

The following will be an explanation of each type, their uses and differences in operation.

DIRECT FIRING

Direct Fired, Low Temperature, Recirculating: This type of furnace is used typically for temperatures less than 1,000°F where the products of combustion can come in direct contact with the parts to be heat treated. Aluminum homogenizing furnaces fall in this category. Typically there are one to four burners firing into or at one end of a plenum chamber. In the opposite end of the plenum is a large recirculating fan (in some cases multiple fans). These fan(s) provide a high volume heated air to scrub the parts. At low temperatures there is little radiant heat transfer, so the large volumes of air flowing across the parts provide the required convective heat transfer. On the burner end of the chamber there is a duct that comes from the large heat treating chamber of the furnace. The burners fire into a chamber where the products of combustion are mixed with the recirculated air from the furnace proper. The mixture of hot gases and recirculated gases are drawn into a recirculating fan and redirected into the furnace. Typically the volume changes range from 10 to 60 furnace volume changes per minute. With the large amounts of air volumes circulating the actual exhaust from the furnace can contain O2 concentrations of 10% to 16%.

Even within this type of furnace there are two types of furnace layouts. One has the burner(s) firing into a specific chamber or plenum where the recirculated air is mixed with the products of combustion prior to entering the recirculating fan inlet. This type of furnace is defined as a batch type. Another configuration is that of a continuous nature that utilizes a conveyer to move parts through the furnace. The conveyer type is frequently used for lower temperature applications starting as low as 425°F, however there are conveyorized furnaces that can run up to about 1700°F. Within this category there are two types of firing scenarios. One is an excess air method of firing and the other is using a recirculating fan method. Generally speaking, the lower the operating temperature the lower the NOx values.

In all cases the firing rate is modulated to maintain the temperature in the heating chamber. In this type of furnace the combustion systems are usually (but not always) ratio based. The ratio however tends to be biased to the excess air side of the stoichiometric ratio. There are some older types of combustion systems that utilize an excess air only type of firing. NOx levels are usually relatively low in this type of furnace, again depending upon furnace configuration and temperature of operation.

Medium Temperature Recirculating: These furnaces are used for steel or alloy heat treating. Temperature ranges are up to approximately 1,700°F. Some of these are continuous conveyorized and others are box batch type. Due to the limitations of recirculating fans, direct firing is used for higher temperature. In this category, usually a single burner configuration is utilized. Many of these furnaces do not have specific flues. The exhaust (products of combustion) exits from the entrance and exit end of the furnace.

High Temperature Direct Fired (ratio, excess air & pulse): This category is used for heat treating a variety of different alloys up to 2100°F. It should be noted that these furnaces are usually very flexible in temperature and many times operate as low as 900F. It should be remembered that temperature uniformity is critical to effective heat treating metallurgy. The combustion systems are multi burner systems that can use as many as three distinctive different methods of firing, ratio, excess air and pulse firing. In some cases, more than one mode of operating is incorporated in the same furnace, usually ratio and excess air.

The different modes of operation are used at different temperatures with the ultimate goal to maintain maximum temperature uniformity to satisfy metallurgical requirements. *Ratio systems* operate by modulating air and the gas is modulated based on air pressure feed to a gas ratio regulator. The correct air/fuel ratio is thereby maintained through the firing rate, this type of system is usually only used at higher temperature. *Excess air* is where the air flow rate is maintained at the maximum and the gas is modulated. This method is used when very tight temperature uniformity is required. *Ratio firing* will typically not yield tight enough uniformity for lower temperatures or critical jobs. The third method of firing is *pulse firing* where the burners are fired on ratio at 100%, but pulsed on and off (or high fire/low fire operation) with the quantity of burners and duration of on/off cycles determined by the temperature requirements of the parts being heat treated. Even this type of system may need some amounts of excess air to achieve desired temperature uniformity. NOx levels vary depending upon burner types, temperatures, air fuel ratio, firing rate and firing method. Needless to say a furnace operating at 900°F is going to have a much lower NOx level than the same furnace operating at 2100°F. Many of the direct fired furnaces utilize high velocity burners to help achieve the high degrees of temperature uniformity required in the lower temperature ranges. The exit velocity of these burners can be as high as 300 miles per hour.

Direct Fired NOx Considerations: As with all categories of heat treat furnaces and processes, the NOx values are wide ranging. Lower temperatures usually yield lower NOx values; higher temperatures yield higher NOx values. Multiple use furnaces operating from 900°F to 2100°F will have different NOx values depending on firing rate, mode of operation, burner type and temperature. The indirect fired recirculating type can generally yield the lowest NOx values (when operating at lower temperatures), the direct fired – the highest NOx values. With that in mind, the NOx values could be from in the 30 ppm range to 60 ppm range at high fire depending upon variables of configuration. On high turn down the NOx ppm values may be as high as 80 ppm, as evidenced by reviewing burner manufacturers published NOx curves.

INDIRECT FIRED FURNACES

Indirect Fired – Recirculating Radiant Tube: Within this type of furnace there are many different types of indirect fired heat treat furnaces – *low temperature radiant tube, medium temperature radiant tube, bell annealing, high temperature radiant tube, continuous strip annealing and wire annealing.*

Low Temperature Radiant Tube: The radiant tube type has multiple burners that fire into individual isolated tubes and is operated usually at less than 1,000°F. These tubes are normally in a "U" shape firing into one end and exhausting from the other end. By design, the flames are usually quite long extending half the length of the tube (in a "U" tube – to the bend). If the total tube length is 16', the flame length will be approximately 8' long. The burners are normally pulse fired with the duration of the on/off cycles determined by the demand for heat. If continuously fired on a modulating cycle, the burner could cause excessive temperature in the tube closest to the burner, causing premature failure to the radiant tube. The tube extends into the heating chamber using radiant heat to transfer heat to the chamber. There is normally a large propeller type of fan that circulates the air across the parts and around the radiant tubes. Normally, there is an inert gas that is introduced into the heating chamber to prevent oxidization of the surface of the metal being heat treated. This type of furnace usually has multiple low BTU (perhaps in the .5 MMBTU/hr range) burners firing into individual radiant tubes. In the previous example the burner, a single large burner (up to >3 MMBTU/hr) fires directly into the firing chamber. In this type of furnace, there may be a metallurgical necessity to purge the working zone of the furnace with an inert gas. This inert gas protects the parts to be heat treated from becoming discolored, particularly important with aluminum where a bright finish is required. In other cases inert gas may not be required, in which case only hot air is recirculated within the furnace – still without products of combustion in direct contact with the parts being heat treated.

Medium Temperature Bell Annealing is another type of indirect fired heat treat furnace. Normally, this furnace operates at higher temperatures, up to 1,500°F, and usually used for annealing steel parts or steel coils. These furnaces are configured quite differently than the radiant tube type of furnace. There is a large bell made of stainless steel that fits over the parts to be annealed. As in the previous case the parts are isolated from the products of combustion but in a dramatically different way. The parts are not aluminum, but share the necessity of not having the products of combustion in direct contact with the parts being annealed. Steel coils are the type of part that requires this type of annealing. The annealing relaxes the stresses introduced into coils when rolling to a precision cross section or slitting to specific widths. Annealing in an inert atmosphere, maintains a bright surface compared to an oxidized (rusted) surface that would occur if the products of combustion were in direct contact with the coils. In this type of furnace there are also fans that recirculate the heated inert gas around the coils to assure the required temperature uniformity while transferring the heat energy from the outside of the bell to the parts contained therein. The coils usually being sold to companies that stamp the coils into finished parts that go into thousands of different parts.

In bell annealing furnaces there are two types of burners used – forward velocity fired tangentially around the large bell and flat flame burners firing directly toward the bells. It is important to note that these burner configurations are specifically designed for a particular furnace configuration, and are not interchangeable. Typically, similar burners can also be used in direct-fired high temperature heat treat furnaces. Whereas, the radiant tube burners can only be used in radiant tubes. This is because there is a need for the flame to extend as far into the tube as possible (usually half the length of the tube or to the bend). These burners cannot be used for any other applications.

Vacuum: There are two types of vacuum heat treat furnaces, electric and gas fired. Obviously, the electric heat treat vacuum generates no NOx emissions. The gas fired vacuum furnaces are a rarity. Due to the low BTU input they are exempt from permitting requirements per Rule 219(b)(2).

High Temperature Radiant Tube: These furnaces typically use silicone carbide or ceramic tubes to transfer the heat to the load. These can operate over 2000°F. Typically, they are not "U" tube configuration but straight through due to the nature of the material used and the furnace configuration. Many of these furnaces are relatively small and would therefore be exempt per Rule 219(b)(2).

Wire Annealing Furnaces: These furnaces are again unique compared to other types of heat treat furnaces. The wire to be annealed is pulled through the furnace heating zone in many strands. The wire comes off of coils of wire and is taken up on coils. The wire is continuously moving through the furnace and has heating and cooling zones of the furnace. Most of these have an inert gas in contact with the wire in the heating zone and are radiant tube fired not dissimilar to other types of radiant tube furnaces. However, the operation is significantly different from other types of radiant tube fired furnaces.

Salt Bath and Fluidized Bed Furnaces: The salt bath type uses salt that is heated with an emersion heater. This is a tube fired burner that heats up a tube that transfers the heat to a salt. The salt becomes molten and when at the proper temperature the parts are placed in a basket and immersed in the liquid salt bath. After a given time the parts are removed and quenched or allowed to air cool. Fluidized bed furnaces have a fluidized bed of material where the heat is directed through a media. The parts are placed in the media and heated to the representative temperature. Generally these are have small BTU input but could possibly be over 2 MMBTU/hr.

There are many other types of small heat treat furnaces that have inputs less than 2 MMBTU/hr and are thus also exempt pursuant to Rule 219(b)(2).

Indirect Firing NOx Considerations: In this indirect firing group of heat treat furnaces, the lowest NOx levels are achieved in the Bell Annealing type of furnace, operating in the 45 – 70 ppm range. However, as is true of heat treat furnaces the NOx levels are dependent upon the furnace temperature, combustion system and furnace configuration. Condition dependent, is the operative word.

The *radiant tube type*s of burners generate the highest emissions from a ppmv NOx point of view, typically over 70 ppm, again depending upon the furnace configuration and temperature of operation. This is primarily due to the nature of pulse firing of radiant tube firing where the flame is designed to travel approximately 50% of the tube length. However, once the parts are up to temperature, the total NOx (pounds per hour) are usually reasonably low compared to the direct-fired furnaces. This is because, once up to temperature, there is a relatively low energy input to maintain temperature. There are new technologies that have come out that can lower the NOx values to less than 60 ppm. However they may not be acceptable for every type of radiant tube firing.

Conclusion: In general, the NOx emissions are determined by a combination of factors: burner type, furnace temperature, combustion system operational system, and furnace configuration. The two different issues are total NOx and ppmv NOx. Even within this type of furnace and burner types there are variables. Total NOx would be the pounds per hour emissions vs. the ppm values, which are an instantaneous value. Virtually all heat treat operations involve a ramping to temperature and a soaking of the material at temperature. There is ramped heating that takes place over many hours and then a soak period that can take longer than 8 hours at temperature. Frequently, once the set point temperature is reached, a relative small input is required to maintain temperature. So for some types of furnaces, the ppm value may be higher but the average firing rate may be relatively low. Thus the overall pounds of NOx emitted into the atmosphere is lower at average firing rates then it is at maximum firing rates with a lower ppm value.

Summary: By a review of the above, one can see that there are a large number of different types of heat treat furnaces – each with its own combustion system and NOx consideration. Even within a specific type of heat treat furnace there are significant numbers of different furnace configurations. Generally there are no standard part number furnaces defined by a manufacturer. Most are custom made for a specific customer, conducting a specific type of heat treating in his facility. Within a given facility there may be more than 6 different configurations of furnace, each type with different burners, controls and operating conditions. These were originally designed to provide a specific heating and uniformity profile. In many cases the burners and combustion systems are not interchangeable from one furnace to another.

Overall, to determine NOx BACT for a particular furnace type one must consider the combination of issues relating to the furnace configuration, burner selection, operating temperature and combustion system firing methodology. We also must understand that the same burners operated under different furnace configuration and temperatures will yield different NOx values and still will be BACT for that specific furnace type.

As it can be seen heat treating is not a one size fits all industry similar to boilers of other types of industries where the process remains relatively constant from company-to-company and job-to-job, furnace to furnace. Many custom built furnaces answer very specific metallurgical requirements that are completely unique to one company, and perhaps only one or two furnaces of that configuration are in existence. For this reason the SCAQMD must evaluate heat treat furnaces on an individual basis - not lumped into a general category. In fact BACT for the heat treating industry could vary from 30 ppm in NOx ppm values to as high as 80 ppm and will still be BACT acceptable, based on furnace type, temperature, firing rate and operating configuration.

ATTACHMENT H

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Final Subsequent Environmental Assessment to the December 2008 Final Environmental Assessment for Proposed Rule 1147 – NOx Reductions from Miscellaneous Sources, and to the September 2011 Final Subsequent Environmental Assessment for Proposed Amended Rule 1147 – NOx Reductions from Miscellaneous Sources

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PREFACE

This document constitutes the Final Subsequent Environmental Assessment (SEA) for Proposed Amended Rule (PAR) 1147 - NOx Reductions From Miscellaneous Sources. SCAQMD prepared a Notice of Preparation/Initial Study (NOP/IS) which identified environmental topics to be analyzed in a Draft Environmental Assessment (EA). Since PAR 1147 was identified in the NOP/IS as potentially having statewide, regional or areawide significance, a CEQA scoping meeting was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017. The NOP/IS was distributed to responsible agencies and interested parties for a 30-day review and comment period from February 1, 2017, to March 3, 2017. SCAQMD received two comment letters relative to the NOP/IS. The comments made at the CEQA scoping meeting and the responses to these comments are included in Appendix D of this Final SEA. The comment letters received relative to the NOP/IS and the responses to the comments are included in Appendix E of this Final SEA.

Following the release of the NOP/IS, further analysis of the proposed project indicated that the type of CEQA document appropriate for the proposed project is a SEA. A Draft SEA was prepared and was then released for a 46-day public review and comment period from March 24, 2017 to May 9, 2017. Analysis of PAR 1147 in the Draft SEA identified the topic of operational air quality as the only area that may be significantly adversely affected by the proposed project. Further analysis of this environmental area in the Draft SEA has confirmed that operational air quality emissions associated with implementing PAR 1147 will exceed the SCAQMD's significance operational threshold for NOx. PAR 1147 did not result in the identification of any other environmental topic areas that would be significantly adversely affected. Four alternatives to the proposed project were analyzed in the Draft SEA. When comparing the environmental effects of the project alternatives with the proposed project and evaluating the effectiveness of achieving the project objectives of the proposed project versus the project alternatives, the proposed project provides the best balance in achieving the project objectives while minimizing the significant adverse environmental impacts to operational air quality. Two comment letters were received from the public regarding the analysis in the Draft SEA. The comment letters received relative to the Draft SEA and responses to individual comments are included in Appendix F of this document.

In addition, subsequent to release of the Draft EA, modifications were made to PAR 1147 and some of the revisions were made in response to verbal and written comments received. To facilitate identification, modifications to the document are included as underlined text and text removed from the document is indicated by ~~strikethrough~~. To avoid confusion, minor formatting changes are not shown in underline or strikethrough mode.

Staff has reviewed the modifications to PAR 1147 and concluded that none of the revisions constitute: 1) significant new information; 2) a substantial increase in the severity of an environmental impact; or, 3) provide new information of substantial importance relative to the draft document. In addition, revisions to the proposed project in response to verbal or written comments would not create new, avoidable significant effects. As a result, these revisions do not require recirculation of the document pursuant to CEQA Guidelines § 15088.5. Therefore, this document now constitutes the Final SEA for PAR 1147.

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CHAPTER 1

EXECUTIVE SUMMARY

INTRODUCTION

The California Legislature created the South Coast Air Quality Management District (SCAQMD) in 1977[1] as the agency responsible for developing and enforcing air pollution control rules and regulations in the South Coast Air Basin (Basin) and portions of the Salton Sea Air Basin and Mojave Desert Air Basin. In 1977, amendments to the federal Clean Air Act (CAA) included requirements for submitting State Implementation Plans (SIPs) for nonattainment areas that fail to meet all federal ambient air quality standards (CAA § 172) and similar requirements exist in state law (Health and Safety Code § 40462). The federal CAA was amended in 1990 to specify attainment dates and SIP requirements for ozone, carbon monoxide (CO), nitrogen dioxide (NO2) and particulate matter with an aerodynamic diameter of less than 10 microns (PM10). In 1997, the United States Environmental Protection Agency (U.S. EPA) promulgated ambient air quality standards for particulate matter with an aerodynamic diameter less than 2.5 microns (PM2.5). The California Clean Air Act (CCAA), adopted in 1988, requires the SCAQMD to achieve and maintain state ambient air quality standards for ozone, CO, sulfur dioxide (SO2), and NO2 by the earliest practicable date (Health and Safety Code § 40910). The CCAA also requires a three-year plan review, and, if necessary, an update to the SIP. The U.S. EPA is required to periodically update the national ambient air quality standards (NAAQS).

By statute, the SCAQMD is required to adopt an air quality management plan (AQMP) demonstrating compliance with all federal and state ambient air quality standards for the areas within SCAQMD jurisdiction[2]. Furthermore, the SCAQMD must adopt rules and regulations that carry out the AQMP[3]. The AQMP is a regional blueprint for how the SCAQMD will achieve air quality standards and healthful air and the Draft Final 2016 AQMP[4] contains multiple goals promoting reductions of criteria air pollutants, greenhouse gases, and toxics. The 2016 AQMP was adopted by the SCAQMD Governing Board on March 3, 2017.

The Basin, which includes all of Orange County and the non-desert portions of Los Angeles, San Bernardino and Riverside counties, has one of the worst air quality problems in the nation. Though there have been significant improvements in air quality in the Basin over the last two decades, some ambient air quality standards are still exceeded relatively frequently and by a wide margin. The 2012 AQMP, submitted to the California Air Resources Board (CARB) for SIP inclusion in December 2012, concluded that further reductions in PM2.5 and oxides of nitrogen (NOx) emissions would be necessary to attain the air quality standards for 24-hour PM2.5 and 8-hour ozone by the dates mandated by federal law. Less emphasis was placed on achieving emission reductions of volatile organic compounds (VOCs) because NOx emission reductions have a greater co-benefit of also reducing ozone, and PM2.5 formation. Ozone, a criteria pollutant that has been

[1] The Lewis-Presley Air Quality Management Act, 1976 Cal. Stats., ch. 324 (codified at Health and Safety Code §§ 40400-40540).
[2] Health and Safety Code § 40460(a).
[3] Health and Safety Code § 40440(a).
[4] SCAQMD, Draft Final 2016 Air Quality Management Plan. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/draft-final-aqmp/clean/2016finaldraftaqmpdec2016(clean).pdf

shown to adversely affect human health, is formed when VOCs react with NOx in the atmosphere. NOx is a precursor to the formation of ozone and PM2.5.

Rule 1147 - NOx Reductions From Miscellaneous Sources, was adopted on December 5, 2008 to control NOx emissions from miscellaneous gas and liquid fuel fired combustion equipment, including, but not limited to: ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, and soil remediation units. Rule 1147 required new, modified, relocated and in-use combustion equipment to comply with equipment-specific NOx emission limits. For in-use equipment, compliance dates for emission limits were based on the date of equipment manufacture, and emission limits went into effect for older equipment first. Owners of equipment were provided at least 15 years before existing equipment would need to be modified or replaced in order to meet the emission limits. Rule 1147 also contained test methods and provided alternate compliance options, including a process for certifying NOx emissions through an approved testing program. Other requirements included equipment maintenance, fuel and time meters and recordkeeping.

Rule 1147 was later amended on September 9, 2011 to: 1) delay implementation dates by up to two years; 2) remove a requirement for fuel or time meters; and 3) provide compliance flexibility for small and large sources. In addition, the amendments included a requirement for a technology assessment to be conducted on the availability of low NOx burner systems for processes with NOx emissions of one pound per day or less that are not typically subject to a BACT requirement as new sources. The technology assessment was completed and included an evaluation of cost and cost effectiveness for small and low emission sources. The technology assessment was reviewed by a third party consultant. As a result, Proposed Amended Rule (PAR) 1147 has been developed to address the recommendations provided by the third party consultant. In addition, PAR 1147 also contains elements to address recommendations proposed by staff (that were separate from the consultant's review) in order to resolve certain stakeholders' compliance issues.

Businesses have expressed concern regarding the cost effectiveness of complying with the rule requirements for small and low emission sources (less than 1 pound per day of NOx). In addition, a technology assessment conducted by staff for these small sources indicates that emission limits should be changed for certain specific applications based on technical feasibility and burner availability. SCAQMD staff estimates that 4,900 to 5,650 out of 6,400 units and up to 3,900 facilities would benefit from delayed compliance requirements and the exemptions proposed in PAR 1147. As many as 3,400 spray booths used in manufacturing, equipment repair and maintenance, and auto body repair will benefit from the proposed amendments.

CALIFORNIA ENVIRONMENTAL QUALITY ACT (CEQA)

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq.*, requires environmental impacts of proposed projects to be evaluated and feasible methods to reduce, avoid or eliminate significant adverse impacts of these projects to be identified and implemented. The lead agency is the "public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment"

(Public Resources Code § 21067). Since the SCAQMD has the primary responsibility for supervising or approving the entire project as a whole, which is a proposed SCAQMD rule, it is the most appropriate public agency to act as lead agency (CEQA Guidelines[5] § 15051(b)).

PAR 1147 is considered a "project" as defined by CEQA. CEQA requires that all potential adverse environmental impacts of proposed projects be evaluated and that methods to reduce or avoid identified significant adverse environmental impacts of these projects be implemented if feasible. The purpose of the CEQA process is to inform the SCAQMD Governing Board, public agencies, and interested parties of potential adverse environmental impacts that could result from implementing the proposed project and to identify feasible mitigation measures or alternatives, when an impact is significant.

Public Resources Code Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written documents in lieu of an environmental impact report once the secretary of the resources agency has certified the regulatory program. The SCAQMD's regulatory program was certified by the secretary of resources agency on March 1, 1989, and has been adopted as SCAQMD Rule 110 – Rule Adoption Procedures to Assure Protection and Enhancement of the Environment. Pursuant to Rule 110 (the rule which implements the SCAQMD's certified regulatory program), SCAQMD prepared a Notice of Preparation/Initial Study (NOP/IS) which identified environmental topics to be analyzed in a Draft Environmental Assessment (EA). Since PAR 1147 was identified in the NOP/IS as potentially having statewide, regional or areawide significance, a CEQA scoping meeting is required (pursuant to Public Resources Code Section 21083.9(a)(2)) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017.

The NOP/IS provided information about the proposed project to other public agencies and interested parties prior to the intended release of the Draft EA. The NOP/IS was distributed to responsible agencies and interested parties for a 30-day review and comment period from February 1, 2017, to March 3, 2017. The initial evaluation in the NOP/IS identified the topic of operational air quality as potentially having potentially significant adverse impacts requiring further review. During the public comment period, the SCAQMD received two comment letters relative to the NOP/IS.

Following the release of the NOP/IS, further analysis of the proposed project indicated that the type of CEQA document appropriate for the proposed project is a Subsequent Environmental Assessment (SEA), in lieu of an EA. The SEA is a substitute CEQA document, prepared in lieu of a Subsequent EIR (CEQA Guidelines § 15162(b)), pursuant to the SCAQMD's Certified Regulatory Program (CEQA Guidelines § 15251(l); codified in SCAQMD Rule 110). Therefore, a SEA is appropriate because new information of substantial importance, which was not known and could not have been known at the time the Final EA was certified for the adoption of Rule 1147 in December 2008 (referred to herein at the December 2008 Final EA) and the Final Subsequent EA that was certified for the amendments to Rule 1147 in September 2011 (referred

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[5] The CEQA Guidelines are codified at Title 14 California Code of Regulations § 15000 *et seq.*

to herein as the September 2011 Final SEA), became available (CEQA Guidelines § 15162(a)(3)). Further, PAR 1147 is expected to have significant effects that were not discussed in the previous December 2008 Final EA or September 2011 Final SEA (CEQA Guidelines § 15162(a)(3)(A)). In the event that new information becomes available that would change a project, the lead agency shall prepare a subsequent Environmental Impact Report (EIR) (CEQA Guidelines § 15162(b)). However, under SCAQMD's certified regulatory program, an equivalent document, a subsequent EA, can be a substitute for preparing a subsequent EIR.

The SEA is also a public disclosure document intended to: 1) provide the lead agency, responsible agencies, decision makers and the general public with information on the environmental impacts of the proposed project; and 2) be used as a tool by decision makers to facilitate decision making on the proposed project.

Thus, the SCAQMD, as lead agency for the proposed project, has prepared the Draft SEA pursuant to its Certified Regulatory Program. The Draft SEA identified and analyzed the topic of operational air quality as the only area that may have significant adverse impacts if the proposed project is implemented. The Draft SEA concluded that only the topic of operational air quality emission impacts would have significant adverse impacts. Because PAR 1147 may have statewide, regional or areawide significance, a CEQA scoping meeting was required for the proposed project pursuant to Public Resources Code § 21083.9(a)(2) and was held at the SCAQMD’s Headquarters in conjunction with the Public Workshop on February 15, 2017. Further, pursuant to CEQA Guidelines § 15252, since significant adverse impacts were identified, an alternatives analysis and mitigation measures are required.

The Draft SEA ~~is being~~was released for a 46-day public review and comment period from March 24, 2017 to May 9, 2017. The comments made at the CEQA scoping meeting and the responses to these comments are included in Appendix D of this Final SEA. The comment letters received relative to the NOP/IS and the responses to the comments are included in Appendix E of this Final SEA. In addition, all comments received during the public comment period on the analysis presented in the Draft SEA have ~~will~~ been responded to and included in ~~an~~ A~~a~~ppendix F ~~to~~ of the Final SEA.

Subsequent to release of the Draft SEA, modifications were made to PAR 1147 and some of the revisions were made in response to verbal and written comments on the project’s effects. At the time the Draft SEA was released for public review and comment, the estimate of total NOx emission reductions foregone of 0.9 ton per day included the portion of emission reductions foregone attributable to the original proposal to increase the NOx compliance limit for low temperature ovens and other units with a heat rating less than 325,000 BTU per hour until 2044. However, subsequent to the release of the Draft SEA, the proposed project was modified to fully exempt all units, not just low temperature units, in this category. The effect of exempting these units is now expected to have permanent, instead of temporary, NOx emission reductions foregone of approximately 49 pounds per day, which is less than the NOx significance threshold of 55 pounds per day. Staff has reviewed the modifications to PAR 1147 and concluded that none of the modifications constitute significant new information or a substantial increase in the severity of an environmental impact, nor provide new information of substantial importance relative to the

<u>draft document. In addition, revisions to PAR 1147 in response to verbal or written comments would not create new, avoidable significant effects. As a result, these revisions do not require recirculation of the Draft SEA pursuant to CEQA Guidelines § 15088.5.</u>

Prior to making a decision on the adoption of PAR 1147, the SCAQMD Governing Board must review and certify the Final SEA, including responses to comments, as providing adequate information on the potential adverse environmental impacts that may occur as a result of adopting PAR 1147.

PREVIOUS CEQA DOCUMENTATION FOR RULE 1147

This Final SEA is a comprehensive environmental document that analyzes potential environmental impacts from PAR 1147. SCAQMD rules, as ongoing regulatory programs, have the potential to be revised over time due to a variety of factors (e.g., regulatory decisions by other agencies, new data, and lack of progress in advancing the effectiveness of control technologies to comply with requirements in technology forcing rules, etc.). Rule 1147 was adopted in December 2008 and amended in September 2011. An environmental analysis was prepared for each of these regulatory actions. In addition, as part of the currently proposed amendments to Rule 1147, the SCAQMD prepared a NOP/IS and the initial evaluation identified the topic of operational air quality as potentially having potentially significant adverse impacts requiring further review. The conclusion in the NOP/IS is consistent with the conclusions reached in the previously certified documents (also described in this section) that aside from the topic of operational air quality, there would be no other significant adverse effects from implementing PAR 1147.

The following summarizes the previously prepared CEQA documents for Rule 1147 in reverse chronological order and is included for informational purposes. These documents are available for downloading from the SCAQMD's website via the links immediately following the summaries. In addition, hardcopies of these CEQA documents can be obtained by contacting Fabian Wesson, Public Advisor at the SCAQMD's Public Information Center by phone at (909) 396-2688 or by email at PICrequests@aqmd.gov.

<u>Notice of Preparation/Initial Study for Proposed Amended Rule 1147 (February 2017)</u>

NOP/IS for Proposed Amended Rule 1147 – NOx Reductions from Miscellaneous Sources, February 2017 (SCAQMD No. 01312016SW; State Clearinghouse No. 2009061088), SCAQMD staff is proposing to amend Rule 1147 in order to resolve Rule 1147 compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would: 1) change the NOx emission limit for low temperature (<1,200 degrees Fahrenheit, ºF) ovens and other units with a heat input rating of less than 325,000 BTU/hour from 30 parts per million (ppm) to 60 ppm; 2) change the NOx emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm; 3) change the compliance date for small in-use units (with NOx emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 35 year lifetime or until the units are replaced, retrofit or relocated; 4) change the compliance date for heated process tanks from a schedule based on a 15 year to 20 year lifetime to when the units are replaced, retrofit or relocated; 5) add a testing exemption for ultra-low NOx infrared burners; 6) clarify an exemption for food ovens; and 7) clarify an exemption for flare type systems. Some facilities that may be affected by PAR 1147 are identified on lists compiled by the California

Department of Toxic Substances Control per California Government Code § 65962.5. SCAQMD as Lead Agency prepared this NOP/IS for the proposed project. The initial evaluation in the NOP/IS identified the topic of air quality as potentially being adversely affected by the proposed project: If implemented, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time.

The NOP/IS for PAR 1147 was released for a 30-day public review and comment period from February 1, 2017 to March 3, 2017. Two comment letters were received during this comment period. Also, because PAR 1147 may have statewide, regional or areawide significance, a CEQA scoping meeting was required for the proposed project pursuant to Public Resources Code § 21083.9(a)(2) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017. Of the comments received on the NOP/IS and at the CEQA scoping meetings, none of the comments changed the conclusions. This document can be obtained by visiting the following website at:

http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2016/par1147_nopis.pdf

Final Subsequent Environmental Assessment for Proposed Amended Rule 1147 (September 2011)

Final SEA for Proposed Amended Rule 1147 – NOx Reductions from Miscellaneous Sources; September 2011 (SCAQMD No. 02012011BAR; State Clearinghouse No. 2011011088): PAR 1147 was adopted to respond to compliance challenges experienced by certain affected sources that would: 1) remove the requirements for installation of time meters; 2) remove the requirements for installation of non-resettable totalizing fuel meters if the operator intends to comply with the Rule 1147 NOx emission limits in terms of parts per million (ppm); and; 3) extend deadlines for demonstrating compliance with the early phases (2010/2011) for NOx emission limits by up to two years. Other minor changes were proposed for clarity and consistency throughout the rule. The September 2011 Final SEA concluded that the adoption of PAR 1147 would only generate significant adverse impacts for the topic of air quality. The September 2011 Final SEA was certified by the SCAQMD Governing Board on September 9, 2011. This document can be obtained by visiting the following website at:

http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2011/final-subsequent-environmental-assessment-for-proposed-amended-rule-1147.pdf.

Final Environmental Assessment (EA) for Proposed Rule 1147 (December 2008)

Final EA for Proposed Rule 1147 – NOx Reductions from Miscellaneous Sources; December 2008 (SCAQMD No. 081015JJI; State Clearinghouse No. 2008101082): Rule 1147 was adopted to implement 2007 AQMP control measures CMB-01 (NOx Reductions from Non-RECLAIM Ovens, Dryers, and Furnaces) and MCS-01 (Facility Modernization) to achieve NOx reductions from miscellaneous gas and liquid fuel fired combustion equipment, including, but not limited to: ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, and soil remediation units. At the time of adoption, Rule 1147 was estimated to reduce annual average emissions of NOx by 3.5 tons per day by 2014 and 3.8 tons per day by 2023. A Draft EA for the adoption of Rule 1147 was released for a 30-day public review and comment period from October 16, 2008 to November 14, 2008. No comment letters were received relative to the Draft EA. The environmental analysis in the Draft EA concluded that the adoption of proposed Rule 1147 would not generate any significant adverse environmental impacts. After circulation of the Draft EA, a Final EA was prepared and certified by the SCAQMD Governing Board on December 5, 2008. This document can be obtained by visiting the following website at:

http://www.aqmd.gov/ceqa/documents/2008/aqmd/finalEA/FEA1147.pdf.

INTENDED USES OF THIS DOCUMENT

In general, a CEQA document is an informational document that informs a public agency's decision-makers and the public generally of potentially significant adverse environmental effects of a project, identifies possible ways to avoid or minimize the significant effects, and describes reasonable alternatives to the project (CEQA Guidelines § 15121). A public agency's decision-makers must consider the information in a CEQA document prior to making a decision on the project. Accordingly, this Draft SEA is intended to: a) provide the SCAQMD Governing Board and the public with information on the environmental effects of the proposed project; and b) be used as a tool by the SCAQMD Governing Board to facilitate decision making on the proposed project.

Additionally, CEQA Guidelines § 15124(d)(1) requires a public agency to identify the following specific types of intended uses of a CEQA document:

1. A list of the agencies that are expected to use the SEA in their decision-making;

2. A list of permits and other approvals required to implement the project; and,

3. A list of related environmental review and consultation requirements required by federal, state, or local laws, regulations, or policies.

There are no permits or other approvals required to implement PAR 1147. Moreover, PAR 1147 is not subject to any other related environmental review or consultation requirements.

To the extent that local public agencies, such as cities, county planning commissions, et cetera, are responsible for making land use and planning decisions related to projects that must comply with the requirements in PAR 1147, they could possibly rely on this SEA during their decision-making process. Similarly, other single purpose public agencies approving projects at facilities complying with the proposed project may rely on this SEA.

AREAS OF CONTROVERSY

CEQA Guidelines § 15123(b)(2) requires a public agency to identify the areas of controversy in the CEQA document, including issues raised by agencies and the public. Over the course of developing the proposed project, the predominant concerns expressed by representatives of industry and environmental groups, either in public meetings or in written comments, regarding the proposed project are highlighted in Table 1-1.

Table 1-1
Areas of Controversy

Areas of Controversy	Topics Raised by the Public	SCAQMD Evaluation
Lack of availability of the burners, ovens, incinerators, related equipment, and small existing in-use units (with NOx emissions of one pound per day or less)	Suppliers cannot consistently provide an equipment that meets the emission limit for a particular application.	A technology assessment has been performed for the equipment subject to the requirements in Rule 1147. The conclusion in the technology assessment recommended providing additional time for achieving compliance; and changing the emissions limits for certain existing equipment as described in the PAR 1147.

Pursuant to CEQA Guidelines § 15131(a), "Economic or social effects of a project shall not be treated as significant effects on the environment." CEQA Guidelines § 15131(b) states further, "Economic or social effects of a project may be used to determine the significance of physical changes caused by the project." Physical changes that may be caused PAR 1147 have been evaluated in Chapter 4 of this SEA. No direct or indirect physical changes resulting from economic or social effects have been identified as a result of implementing PAR 1147.

Of the topics discussed to address the concerns raised relative to CEQA and the secondary impacts that would be associated with implementing the proposed project, to date, no other controversial issues were raised as a part of developing the proposed project.

EXECUTIVE SUMMARY

CEQA Guidelines § 15123 requires a CEQA document to include a brief summary of the proposed actions and their consequences. In addition, areas of controversy including issues raised by the public must also be included in the executive summary (see preceding discussion). This SEA consists of the following chapters: Chapter 1 – Executive Summary; Chapter 2 – Project Description; Chapter 3 – Existing Setting, Chapter 4 – Potential Environmental Impacts and Mitigation Measures; Chapter 5 – Project Alternatives; and various appendices. The following subsections briefly summarize the contents of each chapter.

Summary of Chapter 1 – Executive Summary

Chapter 1 includes an introduction of the proposed project and a discussion of the legislative authority that allows the SCAQMD to amend and adopt air pollution control rules, identifies general CEQA requirements and the intended uses of this CEQA document, and summarizes the remaining four chapters that comprise this SEA.

Summary of Chapter 2 - Project Description

PAR 1147 reflects the recommendations made in the technology assessment and contains additional changes necessary to resolve compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would:

- ~~change~~ remove the requirement to comply with the NOx emission limit for ~~low temperature (<1,200 degrees Fahrenheit (°F)) ovens and other~~ units with a heat input rating of less than 325,000 British Thermal Units per hour (BTU/hour). These units would still be subject to maintenance and recordkeeping requirements ~~from 30 parts per million (ppm) to 60 ppm~~;
- change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm;
- change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 30 year lifetime or until the units are replaced~~,~~ or retrofit ~~or relocated~~;
- change the compliance date for existing in-use heated process tanks and pressure washers from a schedule based on a 15 year to 20 year lifetime to when the units are replaced or~~,~~ retrofit ~~or relocated~~. These units would not be required to comply with an emission limit at any specific age and may be relocated with a facility move;
- add a testing exemption for ultra-low NO_x infrared burners;
- provide compliance flexibility for low emission units by clarifying options for demonstrating emissions less than one pound per day;
- add an exemption for units with emission less than one pound per day when a company relocates a facility and remains under the same ownership;
- add an exemption for units that become subject to the rule upon amendment of Rule 219 on or after May 5, 2017, until the unit is replaced;
- add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee;
- clarify an exemption for food ovens; and
- clarify an exemption for flare type systems.

If adopted, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day in 2017. However, while most of the estimated NOx emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time, approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent (see Table 4-3).

Other minor changes are also proposed for clarity and consistency throughout the rule. A copy of PAR 1147 can be found in Appendix A of this SEA.

Summary of Chapter 3 - Existing Setting

Pursuant to the CEQA Guidelines § 15125, Chapter 3 – Existing Setting, includes a description of the environmental area (e.g., air quality) that was identified in the NOP/IS (see Appendix B of this SEA) as being potentially adversely affected by PAR 1147. The following discussion briefly highlights the existing setting for the topic of air quality.

Air Quality

Air quality in the area of the SCAQMD's jurisdiction has shown substantial improvement over the last two decades. Nevertheless, some federal and state air quality standards are still exceeded frequently and by a wide margin. Of the NAAQS established for seven criteria pollutants (ozone, lead, SO2, NO2, CO, PM10 and PM2.5), the area within the SCAQMD's jurisdiction is only in attainment with the NAAQS for CO, SO2, and NO2. Chapter 3 provides a brief description of the existing air quality setting for each criteria pollutant, as well as the human health effects resulting from exposure to each criteria pollutant.

Summary of Chapter 4 - Environmental Impacts

CEQA Guidelines § 15126(a) requires a CEQA document to identify and focus on the "significant environmental effects of the proposed project." Direct and indirect significant effects of the project on the environment shall be clearly identified and described, giving due consideration to both the short-term and long-term effects. In addition, CEQA Guidelines § 15126(b) requires a CEQA document to identify the significant environmental effects which cannot be avoided if the proposed project is implemented. CEQA Guidelines § 15126(c) also requires a CEQA document to consider and discuss the significant irreversible environmental changes which would be involved if the proposed project is implemented. Further, CEQA Guidelines § 15126(e) requires a CEQA document to consider and discuss mitigation measures proposed to minimize the significant effects. Finally, CEQA Guidelines § 15130 requires a CEQA document to discuss whether the proposed project has cumulative impacts. Chapter 4 considers and discusses each of these requirements.

A NOP/IS was prepared for the proposed project that includes an environmental checklist of approximately 17 environmental topics to be evaluated for potentially significant adverse impacts from a proposed project. Review of the proposed project at the NOP/IS stage identified only one environmental topic area, operational air quality, as having potentially significant adverse impacts requiring further review in this SEA. Further review of this environmental topic area is contained in this chapter.

In addition, where the NOP/IS concluded that the project would have no significant or less than significant direct or indirect adverse effects on the remaining environmental topics areas, the conclusions for these environmental topic areas are consistent with the conclusions reached in the previously certified documents (e.g., the December 2008 Final EA and the September 2011 Final SEA) that aside from the topic of operational air quality, there would be no other significant adverse effects from implementing PAR 1147. Further, of the comments received on the NOP/IS or at the CEQA scoping meetings, none of the comments changed this conclusion. The screening analysis in the NOP/IS concluded that the following environmental areas would not be significantly adversely affected by the proposed project:

- aesthetics
- air quality during construction and greenhouse gas emissions during construction and operation
- agriculture and forestry resources
- biological resources
- cultural resources
- energy
- geology and soils
- hazards and hazardous materials
- hydrology and water quality
- land use and planning
- mineral resources
- noise
- population and housing
- public services
- recreation
- solid and hazardous waste
- transportation and traffic

Other CEQA Topics

CEQA documents are also required to consider and discuss the potential for growth-inducing impacts (CEQA Guidelines § 15126(d) and to explain and make findings about the relationship between short-term uses and long-term productivity (CEQA Guidelines § 15065(a)(2). Additional analysis of the proposed project confirms that it would not result in irreversible environmental changes or the irretrievable commitment of resources, foster economic or population growth or the construction of additional housing. Further, implementing the proposed project is not expected to achieve short-term goals at the expense of long-term environmental productivity or goal achievement.

Summary Chapter 5 - Alternatives

Four alternatives to the proposed project are summarized in Table 1-2: Alternative A (No Project), Alternative B (More Stringent), Alternative C (Less Stringent), and Alternative D (Least Stringent). Pursuant to the requirements in CEQA Guidelines § 15126.6(b) to mitigate or avoid the significant effects that a project may have on the environment, a comparison of the potentially significant adverse operational air quality impacts from each of the project alternatives for the individual rule components that comprise the proposed project is provided in Table 1-3. Aside from operational air quality impacts, no other potentially significant adverse impacts were identified for the proposed project or any of the project alternatives. The proposed project is considered to provide the best balance between the remaining emission reductions that other components of Rule 1147 may continue to achieve and the adverse environmental impacts due to operation activities (from emission reductions foregone) while meeting the objectives of the project. Therefore, the proposed project is preferred over the project alternatives.

Table 1-2
Summary of the Proposed Project and Alternatives

Category		Proposed Project	Alternative A: No Project	Alternative B: More Stringent	Alternative C: Less Stringent	Alternative D: Least Stringent
Equipment with NOx emissions < 1 lb/day	Require compliance with emission limit at specific age	30 years, (less stringent than current rule)	20 years (same as current rule but more stringent than proposed project)	25 years (less stringent than current rule but more stringent than proposed project)	No age requirement (less stringent than current rule and proposed project)	No age requirement (less stringent than current rule and proposed project)
	Demonstration of compliance with NOx emission limit	Applicable to new, replacement and rebuilt units but not to relocation of units by the same company and owner	Applicable to new, replacement and rebuilt units (current rule)	Applicable to new, replacement and rebuilt units (same as current rule)	Applicable to new, replacement and rebuilt units but not to relocation of units by the same company and owners	Compliance with limit is not required if provided that records demonstrate emissions < 1 lb/day. However, if records do not demonstrate < 1 lb/day NOx or records are not kept, then the owner/operator shall demonstrate compliance with unit specific NOx limit.
	Other requirements or exemptions	~~N/A~~Further relax limits for units < 325,000 BTU/hour by exempting from any limit	N/A	Require compliance with emission (ppm) limits when multiple similar process units at a facility have combined emissions ≥ 1 lb/day NOx (more stringent than proposed project).	Exempt all pressure washers (less stringent than proposed project) and units < ~~≤ 800 °F and~~ 325,000 BTU/hour from any limit.	Exempt all pressure washers (less stringent than proposed project)~~.~~ and units < 325,000 BTU/hour from any limit.

Table 1-3
Comparison of Significant Adverse Operational Air Quality Impacts of the Proposed Project and Alternatives

Environmental Topic Area	Proposed Project	Alternative A: No Project	Alternative B: More Stringent	Alternative C: Less Stringent	Alternative D: Least Stringent
Air Quality During Operation	NOx emission reductions foregone up to 0.9 ton per day. ~~The~~ Most emission~~s~~ reductions will be recovered over time. Permanent NOx emission reductions foregone up to 0.03 ton per day (see Table 4-3).	No new NOx emission reductions foregone.	NOx emission reductions foregone up to 0.9 ton per day. The emission~~s~~ reductions foregone will be recovered, but over a shorter time frame than the proposed project.	NOx emission reductions foregone up to 0.9 ton per day. The emission~~s~~ reductions foregone will be recovered, but over a longer time frame than the proposed project.	Permanent NOx emission reductions foregone up to 0.9 ton per day.
Significance of Air Quality Operational Impacts?	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day.	Not significant, however, compliance may be difficult to achieve for categories of equipment where the proposed project changes emission limits.	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (less significant than the proposed project for years 2018 and beyond).	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (more significant than the proposed project for years 2018 and beyond).	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (more significant than the proposed project for years 2018 and beyond).

CHAPTER 2

PROJECT DESCRIPTION

Project Location

Project Background

Project Objective

Project Description

Technology Assessment

Summary of Affected Equipment

PROJECT LOCATION

PAR 1147 would affect up to 3,900 facilities which are located within SCAQMD's jurisdiction. The SCAQMD has jurisdiction over an area of approximately 10,743 square miles, consisting of the four-county South Coast Air Basin (Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino counties), and the Riverside County portions of the Salton Sea Air Basin (SSAB) and Mojave Desert Air Basin (MDAB). The Basin, which is a subarea of SCAQMD's jurisdiction, is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. It includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties. The Riverside County portion of the SSAB is bounded by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley. A federal nonattainment area (known as the Coachella Valley Planning Area) is a subregion of Riverside County and the SSAB that is bounded by the San Jacinto Mountains to the west and the eastern boundary of the Coachella Valley to the east (see Figure 2-1).

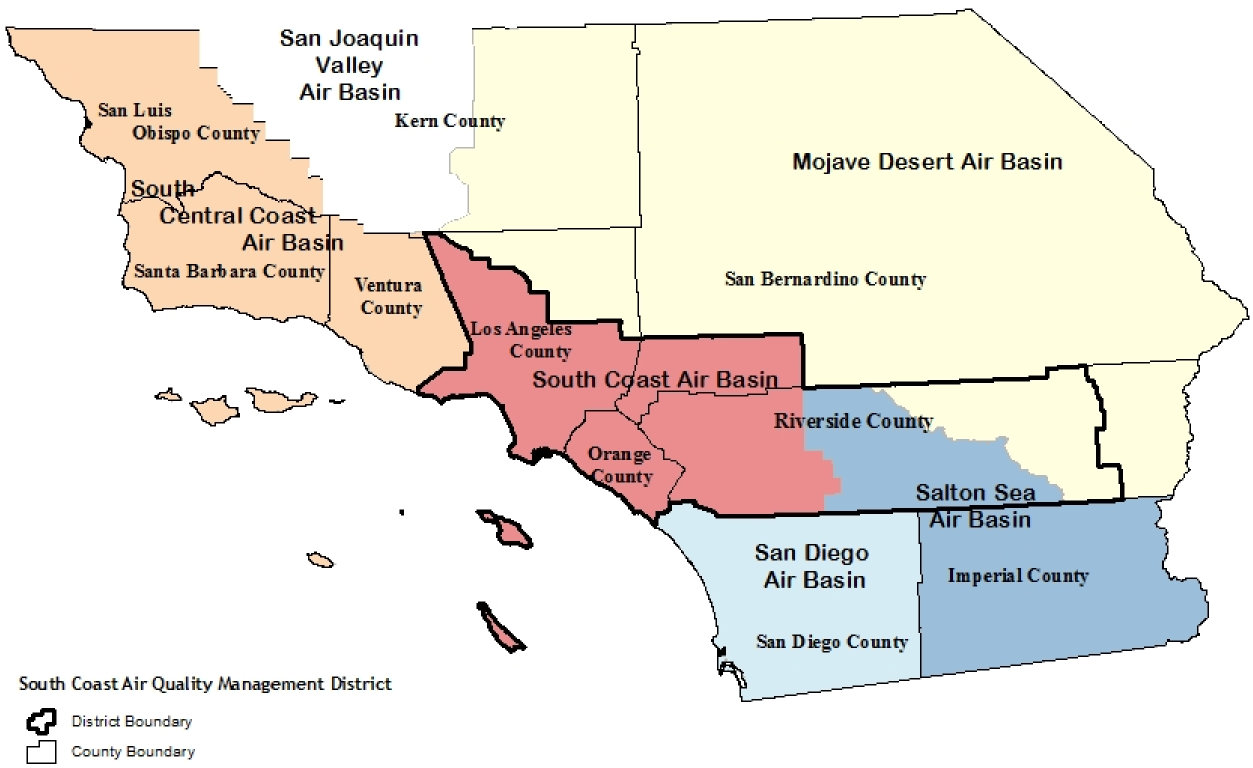

Figure 2-1
Southern California Air Basins

PROJECT BACKGROUND

When Rule 1147 was originally adopted by the SCAQMD Governing Board on December 5, 2008, it established NOx emission limits for a variety of combustion equipment and affected new and existing combustion equipment requiring permits that are not regulated by other SCAQMD rules limiting emissions of NOx. Rule 1147 incorporated two control measures of the 2007 AQMP: CMB-01 – NOx Reductions from Non-RECLAIM Ovens, Dryers and Furnaces, and MCS-01 – Facility Modernization. Control Measure MCS-01 proposed that existing in-use equipment over time meet best available control technology (BACT) emission limits in place at the time the 2007 AQMP was adopted. Control Measure CMB-01 proposed emission NOx limits in the range of 20 to 60 parts per million (ppm) for ovens, dryers, kilns, furnaces and other combustion equipment.

Under Rule 1147, regulated gaseous fuel-fired equipment must meet an emission limit of 30 or 60 ppm of NOx based on the type of equipment and process temperature. All regulated liquid fuel-fired equipment must meet an emission limit of 40 or 60 ppm for NOx based on its process temperature. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of equipment are provided at least 15 years before they must modify or replace existing equipment to meet emission limits.

Rule 1147 also established NOx emissions test methods and provided alternate compliance options including a process for certification of equipment through an approved testing program. Other requirements included equipment maintenance, time and fuel meter installation and record keeping.

Rule 1147 was subsequently amended on September 9, 2011 to: 1) delay implementation dates by up to two years; 2) remove a requirement for fuel or time meters; and 3) provide compliance flexibility for small and large sources. In addition, the amendments included a requirement for a technology assessment to be conducted on the availability of low NOx burner systems for processes with NOx emissions of one pound per day or less that are not typically subject to a BACT requirement as new sources. The technology assessment was completed and included an evaluation of cost and cost effectiveness for small and low emission sources. The technology assessment was reviewed by a third party consultant. As a result, PAR 1147 was crafted to be consistent with the recommendations provided by the third party consultant. In addition, PAR 1147 also contains elements to address recommendations proposed by staff (that were separate from the consultant's review) in order to resolve certain stakeholders' compliance issues.

PROJECT OBJECTIVE

The primary objective of the proposed project is to address issues of technical feasibility and cost effectiveness that were the basis of recommendations in the SCAQMD "Technology Assessment for Rule 1147 Small and Low Emission Sources." In particular, PAR 1147 was crafted to address recommendations from the Rule 1147 technology assessment which include and address technical and cost effectiveness issues raised by stakeholders. These changes make Rule 1147 more consistent with SCAQMD's new source review (NSR) and best available control technology

(BACT) requirements for small and low emission sources with NOx emissions less than one pound per day.

PROJECT DESCRIPTION

SCAQMD staff is proposing to amend Rule 1147 to reflect the recommendations made in the technology assessment and to resolve compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would:

- ~~Change~~ Remove the requirement to comply with the NOx emission limit for ~~low temperature (<1,200 ºF) ovens and other~~ units with a heat input rating of less than 325,000 BTU/hour ~~from 30 ppm to 60 ppm~~ [see Table 1, paragraph (c)(1)]. These units would still be subject to maintenance and recordkeeping requirements;

- Change the NOx emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm [see Table 1, paragraph (c)(1)];

- Change the compliance date for small in-use units (with NOx emissions of less than one pound per day) from a schedule based on a 20 year lifetime to a 30 year lifetime or when the units are replaced or~~,~~ retrofit ~~or relocated~~ [see paragraph (c)(6)];

- Change the compliance date for existing in-use heated process tanks and pressure washers from a schedule based on a 15 year to 20 year lifetime to when the units are replaced~~,~~ or retrofit ~~or relocated~~. These units would not be required to comply with an emission limit at any specific age and may be relocated with a facility move [see paragraphs (g)(8) and (g)(11)];

- Add a testing exemption for ultra-low NOx infrared burners [see paragraphs (g)(9), (g)(10), and (g)(11)];

- Provide compliance flexibility for low emission units ~~to small emitters (less than one pound per day)~~ by clarifying options for demonstrating emissions less than one pound per day~~recordkeeping~~ [see paragraph (c)(6)];

- Add an exemption for units with emission less than one pound per day when a company relocates a facility and remains under the same ownership [see paragraph (g)(11)];

- Add an exemption for units that become subject to the rule upon amendment of Rule 219 on or after May 5, 2017, until the unit is replaced [see paragraph (g)(10)];

- Add flexibility for demonstrating compliance with emission limits including an alternative compliance demonstration option based on a manufacturer's performance guarantee [see paragraphs (d)(1) - (d)(11)];

- Clarify an exemption for food ovens [see subdivision (a), and paragraphs (g)(1) and (g)(2)]; and

- Clarify an exemption for flare type systems [see subparagraph (g)(3)(E)].

If adopted, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day in 2017. However, while most of the NOx emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time, approximately 0.03 ton per day of NOx emission reductions will be permanently foregone (see Table 4-3). A copy of PAR 1147 can be found in Appendix A of this Draft SEA.

TECHNOLOGY ASSESSMENT

The first phase of the SCAQMD technology assessment targeted sources in which burner technology was either not available or the retrofit cost was comparable to the cost of replacing the unit. Several categories of equipment were identified and removed from Rule 1147. Further, the requirement for a permit for these equipment categories was removed during the May 2013 amendments to SCAQMD Rule 219 – Equipment Not Requiring a Written Permit Pursuant to Regulation II, and SCAQMD Rule 222 – Filing Requirements For Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II. SCAQMD staff continued conducting a technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens, to move existing in-use food ovens, roasters and smokehouses from Rule 1147 into their own rule. Rule 1153.1 was adopted on November 7, 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits, later compliance dates and an exemption for small units. Both SCAQMD Rules 1147 and 1153.1 have been approved by U.S. EPA and are included in the SIP.

The last phase of the technology assessment focused on the remaining categories of small and low emission equipment that were not addressed in SCAQMD Rules 219, 222 and 1153.1. While the technology assessment report focused on equipment with NOx emissions of one pound per day or less, the report also included information and analysis applicable to larger units in response to businesses' concerns regarding the availability of technology for larger equipment.

The technology assessment utilizes information about affected equipment from the SCAQMD's permitting system, SCAQMD Regulation XIII - New Source Review, Rule 1147 emissions testing programs, manufacturers of equipment and burners, affected businesses, consulting engineers, and industry representatives. The technology assessment provides information on the types and number of equipment affected by Rule 1147, emissions characteristics of the affected equipment, and estimates of the cost and cost-effectiveness of replacing existing older combustion systems. Overall, the technology assessment provides insight into compliance and affordability challenges faced by businesses affected by Rule 1147.

With the exception of a few categories of equipment, the technology review demonstrates that low NOx burner systems are available for every category of equipment subject to Rule 1147 and have been since the late 1990s. However, SCAQMD staff has identified the following three types of equipment for which burners are not readily available or cannot be retrofitted: 1) low temperature ovens and dryers with heat inputs of less than 325,000 BTU/hour (0.325 MMBTU/hour); 2) existing heated process tanks, evaporators and parts washers; and 3) low temperature burn-off ovens and incinerators.

As a result of the technology assessment, the following five recommendations were proposed for consideration in future rule amendments to Rule 1147:

1. Exempt sources with total rated heat input less than 325,000 BTU/hour from the Rule 1147 NOx emission limit or alternatively change the emission limit for low temperature units with these small burners from 30 ppm to 60 ppm for NOx;
2. Change the NOx emission limit from 30 ppm to 60 ppm NOx for the primary chamber of all multi-chamber burn-off ovens, burn-out furnaces and incinerators for all process temperature;
3. Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NOx emission limit until such time the combustion system or tank is modified, replaced or relocated;
4. Delay compliance with the NOx emission limit for existing in-use spray booths until the heating system is modified or replaced or the unit is relocated; and
5. Delay compliance with the NOx emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified or replaced or the unit is relocated.

SUMMARY OF AFFECTED EQUIPMENT

A wide variety of processes use equipment that is regulated by Rule 1147. These processes include, but are not limited to, printing, textile processing, product coating; and material processing. A large fraction of the equipment subject to Rule 1147 heats air that is then directed to a process chamber and transfers heat to process materials. Other processes heat materials directly and include equipment such as kilns, process tanks and metallurgical furnaces.

Rule 1147 affects manufacturers (NAICS 31-33), distributors and wholesalers (NAICS 42) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the District (NAICS 21, 23, 31-33, 42, 44, 45, 48, 49, 51-56, 61, 62, 71, 72, 81, and 92). The units affected by the rule are used in industrial, commercial and institutional settings for a wide variety of processes. Some examples of the processes regulated by the rule include metal casting and forging, coating and curing operations, asphalt manufacturing, baking and printing.

Based on active permitted equipment in the SCAQMD, staff has estimated the number of equipment potentially subject to Rule 1147. Staff estimates that as many as 6,400 pieces of equipment are potentially subject to Rule 1147 requirements. More than half of the units (≈ 3,400) are spray booths and prep-stations. Excluding spray booths and prep-stations, staff estimates that at least one quarter of the units in each category will meet Rule 1147 emission limits without retrofitting burners.

The second largest category of equipment is ovens and dryers with approximately 1,100 units subject to the rule. Staff estimates that at least one-third of the permitted ovens will meet Rule 1147 emission limits based on a sample of the burners used in the ovens. There are also approximately 500 additional ovens and dryers with SCAQMD permits that are not subject to Rule 1147 because they are heated electrically, with infrared lamps, or using a boiler or thermal fluid heater. Electric, infrared lamp, and boiler and thermal fluid heated ovens and dryers are not included in the counts of equipment subject to rule requirements.

The third largest group of equipment is air pollution control units that capture and incinerate VOCs, CO, PM and toxics. There are approximately 900 afterburners, degassing units and remediation units. The remaining categories of equipment have significantly fewer units with high temperature processes (metal melting, heat treating, burn off ovens, kilns and crematories) being the next largest group with approximately 700 units in these five categories. Although these categories have fewer equipment, many units have significantly higher emissions than spray booths and small ovens.

CHAPTER 3

EXISTING SETTING

Introduction

Existing Setting

Air Quality

INTRODUCTION

In order to determine the significance of the impacts associated with a proposed project, it is necessary to evaluate the project's impacts against the backdrop of the environment as it exists at the time the environmental analysis is commenced. The CEQA Guidelines define "environment" as "the physical conditions that exist within the area which will be affected by a proposed project including land, air, water, minerals, flora, fauna, ambient noise, and objects of historical or aesthetic significance" (CEQA Guidelines § 15360; see also Public Resources Code § 21060.5). Furthermore, a CEQA document must include a description of the physical environment in the vicinity of the project, as it exists at the time the environmental analysis is commenced, from both a local and regional perspective (CEQA Guidelines § 15125). Therefore, the "environment" or "existing setting" against which a project's impacts are compared consists of the immediate, contemporaneous physical conditions at and around the project site (Remy, et al; 1996).

SCAQMD prepared a NOP/IS which identified environmental topics to be analyzed in a Draft EA. The initial evaluation in the NOP/IS identified the topic of operational air quality as potentially having potentially significant adverse impacts requiring further review. Following the release of the NOP/IS, further analysis of the proposed project indicated that the preparation of a SEA, in lieu of an EA, would be the appropriate document to analyze the potentially significant operational air quality impacts associated with PAR 1147 because new information of substantial importance, which was not known and could not have been known at the time the December 2008 Final EA and September Final SEA were certified, became available (CEQA Guidelines § 15162(a)(3)). Further, PAR 1147 is expected to have significant adverse effects to the topic of operational air quality that were not discussed in the previous December 2008 Final EA or September 2011 Final SEA (CEQA Guidelines § 15162(a)(3)(A)). The following section summarizes the existing setting for operational air quality which was the only environmental topic identified that may be adversely affected by the proposed project. The Final Program EIR for the 2016 AQMP also contains comprehensive information on existing and projected environmental settings for the topic of air quality. Copies of the referenced document are available from the SCAQMD's Public Information Center by calling (909) 396-2432.

EXISTING SETTING

Rule 1147 affects the following categories of gaseous and liquid fuel-fired combustion equipment: 1) remediation units; 2) tar pots; 3) other units manufactured prior to 1986; 4) other units manufactured prior to 1992; and, 5) other units manufactured prior to 1998. Specifically, Rule 1147 controls NOx emissions from miscellaneous gas and liquid fuel fired combustion equipment, including, but not limited to: ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, and soil remediation units. Under Rule 1147, regulated equipment must meet a NOx emission limit of 30 ppm to 60 ppm based on the type of equipment. Alternately, equipment may meet a NOx emission limit between 0.036 lb/MMBTU and 0.080 lb/MMBTU based on the type of equipment

Baseline Emission Inventory

Rule 1147 applies to manufacturers (NAICS 333), distributors and wholesalers (NAICS 423) of combustion equipment, as well as owners and operators of ovens, dryers, furnaces, and other equipment in the district (NAICS 23, 31, 32, and 33, respectively). The units subject to Rule 1147 are used in industrial, commercial and institutional settings for a wide variety of processes. Rule 1147 is applicable to 6,600 units located at 3,000 facilities. At the time Rule 1147 was adopted in 2008, approximately 1,600 units located at 800 facilities already complied with the NOx emission limits. The baseline emission inventory for equipment subject to Rule 1147, as summarized in Table 3-1, was estimated to be 4.9 tons per day of NOx (from 2002 NOx emissions inventory in the 2007 AQMP). The percent of equipment subject to emission limits in each specific year was based upon a survey of the SCAQMD permit database.

Table 3-1
NOx Baseline Emission Inventory for Rule 1147 Equipment
From December 2008 Rule Adoption

Fuel	**Equipment Category**	**Typical Uncontrolled NOx Emissions**	**Rule 1147 NOx Emission Limit**	**No. of Units**	**NOx Baseline Emission Inventory** (tons/day)
Natural Gas	Asphalt Operations	90-120 ppm	40 ppm	71	0.071
	Open Heated Tank or Evaporator	120 ppm	60 ppm or 0.073 lb/mmBTU	200	0.199
	Degassing, Incinerator, or Soil Remediation > 1200° F	120 ppm		480	0.478
	Fryer	120 ppm		101	0.100
	Metal Heat Treating	150-210 ppm		136	0.135
	Metal Melting Furnace	150-210 ppm		118	0.117
	Metal or Tar Pot	90-210 ppm		237	0.236
	Other > 1200° F	120 ppm		295	0.293
	Oven, Dehydrator, Dryer, Heater, etc. ≤ 800° F	120 ppm	20 ppm or 0.024 lb/mmBTU	2,335	2.320
	Degassing, Incinerator, or Soil Remediation ≤ 1200° F	120 ppm	30 ppm or 0.036 lb/mmBTU	479	0.477
	Make Up Air Heater	120 ppm	30 ppm or 0.036 lb/mmBTU	34	0.034
	Oven, Dehydrator, Dryer, Heater, etc. > 800 and ≤ 1200° F	120 ppm		161	0.160
	Tenter Frame or Carpet Dryer	90-120 ppm		45	0.048
	Other Air Heater Outside Building	120 ppm		15	0.015
	Other with Process Temperature ≤ 1200° F	120 ppm		196	0.195

Table 3-1 (Concluded)
NOx Baseline Emission Inventory for Rule 1147 Equipment From December 2008 Rule Adoption

Liquid Fuel	Liquid Fuel > 1200° F	120-180 ppm	60 ppm or 0.080 lb/mmBTU	0	0
	Liquid Fuel ≤ 1200° F	120-180 ppm	40 ppm or 0.053 lb/mmBTU	21	0.021
			Total:	**4,924**	**4.899**

AIR QUALITY

It is the responsibility of SCAQMD to ensure that state and federal ambient air quality standards are achieved and maintained in its geographical jurisdiction. Health-based air quality standards have been established by California and the federal government for the following criteria air pollutants: ozone, CO, NO2, PM10, PM2.5, SO2 and lead. These standards were established to protect sensitive receptors with a margin of safety from adverse health impacts due to exposure to air pollution. The California standards are more stringent than the federal standards and in the case of PM10 and SO2, far more stringent. California has also established standards for sulfates, visibility reducing particles, hydrogen sulfide, and vinyl chloride. The state and national ambient air quality standards for each of these pollutants and their effects on health are summarized in Table 3-2. SCAQMD monitors levels of various criteria pollutants at 38 monitoring stations. The 2015 air quality data (the latest data available) from SCAQMD's monitoring stations are presented in Table 3-3.

Table 3-2
State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	State Standard[a]	Federal Primary Standard[b]	Most Relevant Effects
Ozone (O_3)	1-hour	0.09 ppm (180 µg/m3)	No Federal Standard	(a) Short-term exposures: 1) Pulmonary function decrements and localized lung edema in humans and animals; and, 2) Risk to public health implied by alterations in pulmonary morphology and host defense in animals; (b) Long-term exposures: Risk to public health implied by altered connective tissue metabolism and altered pulmonary morphology in animals after long-term exposures and pulmonary function decrements in chronically exposed humans; (c) Vegetation damage; and, (d) Property damage.
	8-hour	0.070 ppm (137 µg/m3)	0.075 ppm (147 µg/m3)	
Suspended Particulate Matter (PM10)	24-hour	50 µg/m3	150 µg/m3	(a) Excess deaths from short-term exposures and exacerbation of symptoms in sensitive patients with respiratory disease; and (b) Excess seasonal declines in pulmonary function, especially in children.
	Annual Arithmetic Mean	20 µg/m3	No Federal Standard	
Suspended Particulate Matter (PM2.5)	24-hour	No State Standard	35 µg/m3	(a) Increased hospital admissions and emergency room visits for heart and lung disease; (b) Increased respiratory symptoms and disease; and (c) Decreased lung functions and premature death.
	Annual Arithmetic Mean	12 µg/m3	12.0 µg/m3	
Carbon Monoxide (CO)	1-Hour	20 ppm (23 mg/m3)	35 ppm (40 mg/m3)	(a) Aggravation of angina pectoris and other aspects of coronary heart disease; (b) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease; (c) Impairment of central nervous system functions; and, (d) Possible increased risk to fetuses.
	8-Hour	9 ppm (10 mg/m3)	9 ppm (10 mg/m3)	

Table 3-2 (Concluded)

State and Federal Ambient Air Quality Standards

Pollutant	Averaging Time	State Standard[a]	Federal Primary Standard[b]	Most Relevant Effects
Nitrogen Dioxide (NO2)	1-Hour	0.18 ppm (339 µg/m3)	0.100 ppm (188 µg/m3)	(a) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups; (b) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes; and, (c) Contribution to atmospheric discoloration.
	Annual Arithmetic Mean	0.030 ppm (57 µg/m3)	0.053 ppm (100 µg/m3)	
Sulfur Dioxide (SO2)	1-Hour	0.25 ppm (655 µg/m3)	75 ppb (196 µg/m3)–	Broncho-constriction accompanied by symptoms which may include wheezing, shortness of breath and chest tightness, during exercise or physical activity in persons with asthma.
	24-Hour	0.04 ppm (105 µg/m3)	No Federal Standard	
Sulfates	24-Hour	25 µg/m3	No Federal Standard	(a) Decrease in ventilatory function; (b) Aggravation of asthmatic symptoms; (c) Aggravation of cardio-pulmonary disease; (d) Vegetation damage; (e) Degradation of visibility; and, (f) Property damage
Hydrogen Sulfide (H2S)	1-Hour	0.03 ppm (42 µg/m3)	No Federal Standard	Odor annoyance.
Lead (Pb)	30-Day Average	1.5 µg/m3	No Federal Standard	(a) Increased body burden; and (b) Impairment of blood formation and nerve conduction.
	Calendar Quarter	No State Standard	1.5 µg/m3	
	Rolling 3-Month Average	No State Standard	0.15 µg/m3	
Visibility Reducing Particles	8-Hour	Extinction coefficient of 0.23 per kilometer - visibility of ten miles or more due to particles when relative humidity is less than 70 percent.	No Federal Standard	The statewide standard is intended to limit the frequency and severity of visibility impairment due to regional haze. This is a visibility based standard not a health based standard. Nephelometry and AISI Tape Sampler; instrumental measurement on days when relative humidity is less than 70 percent.
Vinyl Chloride	24-Hour	0.01 ppm (26 µg/m3)	No Federal Standard	Highly toxic and a known carcinogen that causes a rare cancer of the liver.

a. The California ambient air quality standards for O3, CO, SO2 (1-hour and 24-hour), NO2, PM10, and PM2.5 are values not to be exceeded. All other California standards shown are values not to be equaled or exceeded.

b. The national ambient air quality standards, other than O3 and those based on annual averages are not to be exceeded more than once a year. The O3 standard is attained when the expected number of days per calendar year with maximum hourly average concentrations above the standards is equal to or less than one.

KEY: ppb = parts per billion parts of air, by volume; ppm = parts per million parts of air, by volume; µg/m3 = micrograms per cubic meter; mg/ m3 = milligrams per cubic meter

Table 3-3

2015 Air Quality Data – South Coast Air Quality Management District

CARBON MONOXIDE (CO)[a]				
Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Max. Conc. ppm, 1-hour	Max.Conc.8ppm, 8-hour
LOS ANGELES COUNTY				
1	Central Los Angeles	365	3.2	1.8
2	Northwest Coastal Los Angeles County	365	1.6	1.4
3	Southwest Coastal Los Angeles County	357	1.7	1.4
4	South Coastal Los Angeles County 1	--	--	--
4	South Coastal Los Angeles County 2	--	--	--
4	South Coastal Los Angeles County 3	364	3.3	2.2
6	West San Fernando Valley	365	3.0	2.5
8	West San Gabriel Valley	365	2.6	1.6
9	East San Gabriel Valley 1	352	2.1	1.3
9	East San Gabriel Valley 2	363	1.2	1.0
10	Pomona/Walnut Valley	346	1.8	1.6
11	South San Gabriel Valley	365	2.8	1.7
12	South Central Los Angeles County	363	4.4	3.3
13	Santa Clarita Valley	359	1.2	0.9
ORANGE COUNTY				
16	North Orange County	365	3.0	1.6
17	Central Orange County	365	3.1	2.2
18	North Coastal Orange County	365	3.0	2.2
19	Saddleback Valley	364	1.4	0.7
RIVERSIDE COUNTY				
22	Norco/Corona	--	--	--
23	Metropolitan Riverside County 1	364	2.5	1.7
23	Mira Loma	362	2.3	1.6
24	Perris Valley	--	--	--
25	Lake Elsinore	364	0.8	0.6
26	Temecula	--	--	--
29	Banning Airport	--	--	--
30	Coachella Valley 1**	365	2.0	0.7
30	Coachella Valley 2**	--	--	--
SAN BERNARDINO COUNTY				
32	Northwest San Bernardino Valley	364	2.1	1.3
34	Central San Bernardino Valley 1	358	2.8	1.2
34	Central San Bernardino Valley 2	362	2.3	1.8
35	East San Bernardino Valley	--	--	--
37	Central San Bernardino Mountains	--	--	--
38	East San Bernardino Mountains	--	--	--
SCAQMD MAXIMUM			4.4	3.3
SOUTH COAST AIR BASIN			4.4	3.3

KEY: ppm = parts per million -- = Pollutant not monitored ** Salton Sea Air Basin

[a] The federal 8-hour standard (8-hour average CO > 9 ppm) and state 8-hour standard (8-hour average CO > 9.0 ppm) were not exceeded. The federal and state 1-hour standards (35 ppm and 20 ppm) were not exceeded either.

Table 3-3 (Continued)

2015 Air Quality Data – South Coast Air Quality Management District

OZONE (O3)										
						No. Days Standard Exceeded				
						Federal			State	
Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Max. Conc. in ppm 1-hr	Max. Conc. in ppm 8-hr	4th High Conc. ppm 8-hr	Old > 0.124 ppm 1-hr	1997 > 0.084 ppm 8-hr	Current >0.075 ppm 8-hr*	Current > 0.09 ppm 1-hr	Current > 0.070 ppm 8-hr
LOS ANGELES COUNTY										
1	Central Los Angeles	365	0.104	0.074	0.072	0	6	0	2	6
2	Northwest Coastal Los Angeles County	353	0.102	0.072	0.069	0	2	0	2	3
3	Southwest Coastal Los Angeles County	365	0.096	0.077	0.069	0	3	1	1	3
4	South Coastal Los Angeles County 1	--	--	--	--	--	--	--	--	--
4	South Coastal Los Angeles County 2	--	--	--	--	--	--	--	--	--
4	South Coastal Los Angeles County 3	364	0.087	0.066	0.056	0	0	0	0	0
6	West San Fernando Valley	365	0.119	0.094	0.087	0	32	15	11	34
8	West San Gabriel Valley	361	0.111	0.084	0.082	0	18	7	12	18
9	East San Gabriel Valley 1	352	0.122	0.096	0.088	0	27	17	21	28
9	East San Gabriel Valley 2	362	0.127	0.102	0.095	2	48	34	37	51
10	Pomona/Walnut Valley	347	0.136	0.098	0.094	2	53	36	30	55
11	South San Gabriel Valley	346	0.107	0.081	0.075	0	11	2	6	11
12	South Central Los Angeles County	361	0.091	0.072	0.065	0	1	0	0	1
13	Santa Clarita Valley	358	0.126	0.108	0.091	1	52	37	23	55
ORANGE COUNTY										
16	North Orange County	365	0.103	0.082	0.073	0	7	2	4	8
17	Central Orange County	365	0.100	0.080	0.065	0	1	1	1	1
18	North Coastal Orange County	364	0.099	0.079	0.068	0	2	1	1	2
19	Saddleback Valley	358	0.099	0.088	0.075	0	8	3	2	8
RIVERSIDE COUNTY										
22	Norco/Corona	--	--	--	--	--	--	--	--	--
23	Metropolitan Riverside County 1	361	0.132	0.105	0.096	1	55	39	31	59
23	Mira Loma	356	0.127	0.104	0.093	1	51	36	29	51
24	Perris Valley	365	0.124	0.102	0.094	0	49	31	25	50
25	Lake Elsinore	362	0.131	0.098	0.093	1	31	19	18	35
26	Temecula	365	0.100	0.087	0.079	0	20	6	1	23
29	Banning Airport	359	0.124	0.097	0.091	0	46	25	16	49
30	Coachella Valley 1**	365	0.102	0.092	0.086	0	47	26	3	51
30	Coachella Valley 2**	287	0.093	0.085	0.079	0	11	4	0	12
SAN BERNARDINO COUNTY										
32	Northwest San Bernardino Valley	364	0.136	0.106	0.101	2	66	53	49	69
34	Central San Bernardino Valley 1	358	0.133	0.111	0.100	3	57	39	36	59
34	Central San Bernardino Valley 2	356	0.134	0.117	0.105	6	78	57	52	79
35	East San Bernardino Valley	329	0.137	0.115	0.102	2	76	54	44	77
37	Central San Bernardino Mountains	365	0.144	0.127	0.107	3	86	61	46	86
38	East San Bernardino Mountains	--	--	--	--	--	--	--	--	--
	SCAQMD MAXIMUM		0.144	0.127	0.107	6	86	61	52	86
	SOUTH COAST AIR BASIN		0.144	0.127	0.107	10	113	81	71	115

KEY:

ppm = parts per million -- = Pollutant not monitored ** Salton Sea Air Basin

- = Incomplete data

Table 3-3 (Continued)

2015 Air Quality Data – South Coast Air Quality Management District

Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	1-hour Max. Conc. ppb, 1,	1-hour 98th Percentile Conc. ppb,	Annual Average AAM Conc. ppb
NITROGEN DIOXIDE (NO_2)[b]					
LOS ANGELES COUNTY					
1	Central Los Angeles	365	79.1	62.4	22.2
2	Northwest Coastal Los Angeles County	365	67.6	49.4	11.7
3	Southwest Coastal Los Angeles County	365	87.0	58.1	10.9
4	South Coastal Los Angeles County 1	--	--	--	--
4	South Coastal Los Angeles County 2	--	--	--	--
4	South Coastal Los Angeles County 3	353	101.8	64.4	19.8
6	West San Fernando Valley	354	72.5	51.7	13.5
8	West San Gabriel Valley	365	74.9	55.9	15.3
9	East San Gabriel Valley 1	351	71.0	58.5	15.4
9	East San Gabriel Valley 2	365	66.2	52.6	11.2
10	Pomona/Walnut Valley	346	72.3	60.3	21.2
11	South San Gabriel Valley	345	70.4	61.6	20.5
12	South Central Los Angeles County	363	73.6	58.7	16.9
13	Santa Clarita Valley	360	64.6	43.5	11.8
ORANGE COUNTY					
16	North Orange County	334	58.0	50.8	15.0
17	Central Orange County	365	59.1	54.6	14.6
18	North Coastal Orange County	357	52.4	47.9	11.6
19	Saddleback Valley	--	--	--	--
RIVERSIDE COUNTY					
22	Norco/Corona	--	--	--	--
23	Metropolitan Riverside County 1	361	57.4	52.3	14.4
23	Mira Loma	362	68.1	49.2	13.4
24	Perris Valley	--	--	--	--
25	Lake Elsinore	357	47.2	38.8	8.7
26	Temecula	--	--	--	--
29	Banning Airport	365	49.6	44.3	8.4
30	Coachella Valley 1**	365	41.5	37.7	6.2
30	Coachella Valley 2**	--	--	--	--
SAN BERNARDINO COUNTY					
32	Northwest San Bernardino Valley	359	71.6	55.7	15.9
34	Central San Bernardino Valley 1	358	89.1	66.1	18.7
34	Central San Bernardino Valley 2	362	71.4	52.7	15.2
35	East San Bernardino Valley	--	--	--	--
37	Central San Bernardino Mountains	--	--	--	--
38	East San Bernardino Mountains	--	--	--	--
SCAQMD MAXIMUM			101.8	66.1	22.2
SOUTH COAST AIR BASIN			101.8	66.1	22.2

KEY:

ppb = parts per billion AAM = Annual Arithmetic Mean -- = Pollutant not monitored ** Salton Sea Air Basin

[b] The NO_2 federal 1-hour standard is 100 ppb and the annual standard is annual arithmetic mean NO_2 > 0.0534 ppm (53.4 ppb). The state 1-hour and annual standards are 0.18 ppm (180 ppb) and 0.030 ppm (30 ppb).

Table 3-3 (Continued)

2015 Air Quality Data – South Coast Air Quality Management District

SULFUR DIOXIDE (SO_2)[c]				
Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Maximum Conc. ppb, 1-hour	99th Percentile Conc. ppb, 1-hour
LOS ANGELES COUNTY				
1	Central Los Angeles	364	12.6	6.3
2	Northwest Coastal Los Angeles County	--	--	--
3	Southwest Coastal Los Angeles County	358	14.9	6.8
4	South Coastal Los Angeles County 1	--	--	--
4	South Coastal Los Angeles County 2	--	--	--
4	South Coastal Los Angeles County 3	296	37.5	11.8
6	West San Fernando Valley	--	--	--
8	West San Gabriel Valley	--	--	--
9	East San Gabriel Valley 1	--	--	--
9	East San Gabriel Valley 2	--	--	--
10	Pomona/Walnut Valley	--	--	--
11	South San Gabriel Valley	--	--	--
12	South Central Los Angeles County	--	--	--
13	Santa Clarita Valley	--	--	--
ORANGE COUNTY				
16	North Orange County	--	--	--
17	Central Orange County	--	--	--
18	North Coastal Orange County	352	4.5	3.1
19	Saddleback Valley	--	--	--
RIVERSIDE COUNTY				
22	Norco/Corona	--	--	--
23	Metropolitan Riverside County 1	363	1.9	1.6
23	Mira Loma	--	--	--
24	Perris Valley	--	--	--
25	Lake Elsinore	--	--	--
26	Temecula	--	--	--
29	Banning Airport	--	--	--
30	Coachella Valley 1**	--	--	--
30	Coachella Valley 2**	--	--	--
SAN BERNARDINO COUNTY				
32	Northwest San Bernardino Valley	--	--	--
34	Central San Bernardino Valley 1	352	4.0	3.1
34	Central San Bernardino Valley 2	--	--	--
35	East San Bernardino Valley	--	--	--
37	Central San Bernardino Mountains	--	--	--
38	East San Bernardino Mountains	--	--	--
SCAQMD MAXIMUM		364	37.5	11.8
SOUTH COAST AIR BASIN		364	37.5	11.8

KEY:

ppb = parts per billion -- = Pollutant not monitored ** Salton Sea Air Basin

[c] The federal SO_2 1-hour standard is 75 ppb (0.075 ppm). The state standards are 1-hour average SO_2 > 0.25 ppm (250 ppb) and 24-hour average SO_2 > 0.04 ppm (40 ppb).

Table 3-3 (Continued)
2015 Air Quality Data – South Coast Air Quality Management District

SUSPENDED PARTICULATE MATTER PM10[d]						
Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Max. Conc. µg/m^3, 24-hour	No. (%) Samples Exceeding Standard		Annual Average AAM Conc.[e)] µg/m^3
				Federal > 150 µg/m^3, 24-hour	State > 50 µg/m^3, 24-hour	
LOS ANGELES COUNTY						
1	Central Los Angeles	58	73	0	2	27.3
2	Northwest Coastal Los Angeles County	-	-	-	-	-
3	Southwest Coastal Los Angeles County	57	42	0	0	21.2
4	South Coastal Los Angeles County 1	-	-	-	-	-
4	South Coastal Los Angeles County 2	58	62	0	2	26.5
4	South Coastal Los Angeles County 3	59	80	0	6	31.5
6	West San Fernando Valley	-	-	-	-	-
8	West San Gabriel Valley	-	-	-	-	-
9	East San Gabriel Valley 1	59	101	0	12	37.1
9	East San Gabriel Valley 2	-	-	-	-	-
10	Pomona/Walnut Valley	-	-	-	-	-
11	South San Gabriel Valley	-	-	-	-	-
12	South Central Los Angeles County	-	-	-	-	-
13	Santa Clarita Valley	52	41	0	0	18.4
ORANGE COUNTY						
16	North Orange County	-	-	-	-	-
17	Central Orange County	56	59	0	2	25.4
18	North Coastal Orange County	-	-	-	-	-
19	Saddleback Valley	51	49	0	0	19.0
RIVERSIDE COUNTY						
22	Norco/Corona	44	87	0	3	29.6
23	Metropolitan Riverside County 1	114	69	0	9	31.7
23	Mira Loma	102	110	0	38	43.3
24	Perris Valley	57	74	0	3	30.3
25	Lake Elsinore	-	-	-	-	-
26	Temecula	-	-	-	-	-
29	Banning Airport	59	139	0	2	22.2
30	Coachella Valley 1**	55	33	0	0	16.7
30	Coachella Valley 2**	91	145	0	18	38.6
SAN BERNARDINO COUNTY						
32	Northwest San Bernardino Valley	-	-	-	-	-
34	Central San Bernardino Valley 1	55	96	0	13	37.8
34	Central San Bernardino Valley 2	57	78	0	3	29.9
35	East San Bernardino Valley	59	95	0	2	24.7
37	Central San Bernardino Mountains	58	41	0	0	16.1
38	East San Bernardino Mountains	-	-	-	-	-
	SCAQMD MAXIMUM		145+	0+	38+	43.3+
	SOUTH COAST AIR BASIN		139+	0+	49+	43.3+

KEY:

µg/m^3 = micrograms per cubic meter of air AAM = Annual Arithmetic Mean -- = Pollutant not monitored ** Salton Sea Air Basin

+ = High FRM and FEM PM10 data samples recorded at locations in Coachella Valley and the Basin are excluded due to the high wind in accordance with the U.S. EPA Exceptional Event Regulation.

d - Federal Reference Method (FRM) PM10 samples were collected every 6 days at all sites except for Stations 4144 and 4157, where samples were collected every 3 days. PM10 statistics listed above are for the FRM data only. Federal Equivalent Method (FEM) PM10 continuous monitoring instruments were operated at some of the above locations. Max 24-hour average PM10 at sites with FEM monitoring was 152 µg/m3, at Indio.

e - State standard is annual average (AAM) > 20 µg/m3. Federal annual PM10 standard (AAM > 50 µg/m3) was revoked in 2006.

Table 3-3 (Continued)

2015 Air Quality Data – South Coast Air Quality Management District

SUSPENDED PARTICULATE MATTER PM2.5 [f]						
Source Receptor Area No.	Location of Air Monitoring Station	No. Days of Data	Max. Conc. µg/m^3, 24-hour	98th Percentile Conc. in µg/m^3 24-hr	No. (%) Samples Exceeding Federal Std > 35 µg/m^3, 24-hour	Annual Average AAM Conc.[g)] µg/m^3
LOS ANGELES COUNTY						
1	Central Los Angeles	342	56.4	38.0	7	12.38
2	Northwest Coastal Los Angeles County	-	-	-	-	-
3	Southwest Coastal Los Angeles County	-	-	-	-	-
4	South Coastal Los Angeles County 1	338	54.6	32.1	3	10.81
4	South Coastal Los Angeles County 2	347	48.3	31.2	4	10.26
4	South Coastal Los Angeles County 3	-	-	-	-	-
6	West San Fernando Valley	113	36.8	28.4	1	8.84
8	West San Gabriel Valley	119	48.5	32.4	2	9.85
9	East San Gabriel Valley 1	120	70.3	30.0	2	9.88
9	East San Gabriel Valley 2	-	-	-	-	-
10	Pomona/Walnut Valley	-	-	-	-	-
11	South San Gabriel Valley	118	52.7	41.8	3	11.52
12	South Central Los Angeles County	111	41.3	37.2	3	11.78
13	Santa Clarita Valley	-	-	-	-	-
ORANGE COUNTY						
16	North Orange County	-	-	-	-	-
17	Central Orange County	295	45.8	29.8	3	9.38
18	North Coastal Orange County	-	-	-	-	-
19	Saddleback Valley	115	31.5	15.1	0	7.05
RIVERSIDE COUNTY						
22	Norco/Corona	-	-	-	-	-
23	Metropolitan Riverside County 1	341	54.7	38.1	9	11.89
23	Mira Loma	343	56.6	43.2	17	13.34
24	Perris Valley	-	-	-	-	-
25	Lake Elsinore	-	-	-	-	-
26	Temecula	-	-	-	-	-
29	Banning Airport	-	-	-	-	-
30	Coachella Valley 1**	108	22.7	17.1	0	5.76
30	Coachella Valley 2**	94	24.6	19.7	0	7.54
SAN BERNARDINO COUNTY						
32	Northwest San Bernardino Valley	-	-	-	-	-
34	Central San Bernardino Valley 1	114	50.5	37.7	3	11.05
34	Central San Bernardino Valley 2	110	53.5	33.6	2	10.74
35	East San Bernardino Valley	-	-	-	-	-
37	Central San Bernardino Mountains	-	-	-	-	-
38	East San Bernardino Mountains	58	39.4	35.3	1	7.59
SCAQMD MAXIMUM			70.3	43.2	17	13.34
SOUTH COAST AIR BASIN			70.3	43.2	25**	13.34

KEY:

µg/m^3 = micrograms per cubic meter of air AAM = Annual Arithmetic Mean -- = Pollutant not monitored ** Salton Sea Air Basin

f PM2.5 samples were collected every 3 days at all sites except for station numbers 072, 077, 087, 3176, 4144 and 4165, where samples were taken daily, and station number 5818 where samples were taken every 6 days. PM2.5 statistics listed above are for the FRM data only. FEM PM2.5 continuous monitoring instruments were operated at some of the above locations for special purposes studies. .

g Both federal and state standards are annual average (AAM) > 12.0 µg/m^3.

Table 3-3 (Concluded)

2015 Air Quality Data – South Coast Air Quality Management District

Source Receptor Area No.	Location of Air Monitoring Station	LEAD[h] Max. Monthly Average Conc. m) μg/m³	LEAD[h] Max. 3-Month Rolling Average m) μg/m³	SULFATES (SOx)[i] No. Days of Data	SULFATES (SOx)[i] Max. Conc. μg/m³, 24-hour
LOS ANGELES COUNTY					
1	Central Los Angeles	0.013	0.01	--	--
2	Northwest Coastal Los Angeles County	--	--	--	--
3	Southwest Coastal Los Angeles County	0.008	0.01	--	--
4	South Coastal Los Angeles County 1	--	--	--	--
4	South Coastal Los Angeles County 2	0.010	0.01	--	--
4	South Coastal Los Angeles County 3	--	--	--	--
6	West San Fernando Valley	--	--	--	--
8	West San Gabriel Valley	--	--	--	--
9	East San Gabriel Valley 1	--	--	--	--
9	East San Gabriel Valley 2	--	--	--	--
10	Pomona/Walnut Valley	--	--	--	--
11	South San Gabriel Valley	0.014	0.01	--	--
12	South Central Los Angeles County	0.014	0.01	--	--
13	Santa Clarita Valley	--	--	--	--
ORANGE COUNTY					
16	North Orange County	--	--	--	--
17	Central Orange County	--	--	--	--
18	North Coastal Orange County	--	--	--	--
19	Saddleback Valley	--	--	--	--
RIVERSIDE COUNTY					
22	Norco/Corona	--	--	--	--
23	Metropolitan Riverside County 1	0.008	0.01	--	--
23	Mira Loma	--	--	--	--
24	Perris Valley	--	--	--	--
25	Lake Elsinore	--	--	--	--
26	Temecula	--	--	--	--
29	Banning Airport	--	--	--	--
30	Coachella Valley 1**	--	--	--	--
30	Coachella Valley 2**	--	--	--	--
SAN BERNARDINO COUNTY					
32	Northwest San Bernardino Valley	0.010	0.01	--	--
34	Central San Bernardino Valley 1	--	--	--	--
34	Central San Bernardino Valley 2	0.012	0.01	--	--
35	East San Bernardino Valley	--	--	--	--
37	Central San Bernardino Mountains	--	--	--	--
38	East San Bernardino Mountains	--	--	--	--
SCAQMD MAXIMUM		0.014	0.010	--	--
SOUTH COAST AIR BASIN		0.014	0.010	--	--

KEY:

μg/m³ = micrograms per cubic meter of air -- = Pollutant not monitored ** Salton Sea Air Basin

h Federal lead standard is 3-months rolling average > 0.15 μg/m³; state standard is monthly average ≥ 1.5 μg/m³. .Lead standards were not exceeded.

i Sulfate data is not available at this time. State sulfate standard is 24-hour 25 μg/m3. There is no federal standard for sulfate.

Carbon Monoxide

CO is a primary pollutant, meaning that it is directly emitted into the air, not formed in the atmosphere by chemical reaction of precursors, as is the case with ozone and other secondary pollutants. Ambient concentrations of CO in the Basin exhibit large spatial and temporal variations due to variations in the rate at which CO is emitted and in the meteorological conditions that govern transport and dilution. Unlike ozone, CO tends to reach high concentrations in the fall and winter months. The highest concentrations frequently occur on weekdays at times consistent with rush hour traffic and late night during the coolest, most stable portion of the day.

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of worsening oxygen supply to the heart.

Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport by competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include patients with diseases involving heart and blood vessels, fetuses, and patients with chronic hypoxemia (oxygen deficiency) as seen in high altitudes.

Reductions in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels. These include preterm births and heart abnormalities.

CO concentrations were measured at 23 locations in the Basin and neighboring Salton Sea Air Basin areas in 2014. CO concentrations did not exceed the standards in 2014. The highest 1-hour average CO concentration recorded (4.4 ppm in the South Central Los Angeles County area) was 22 percent of the federal 1-hour CO standard of 20 ppm. The highest 8-hour average CO concentration recorded (3.3 ppm in the South Central Los Angeles County area) was 37 percent of the federal 8-hour CO standard of 9.0 ppm. The state 1-hour standard is also 9.0 ppm. The highest 8-hour average CO concentration is 17 percent of the state 8-hour CO standard of 20 ppm.

In 2004, SCAQMD formally requested the U.S. EPA to re-designate the Basin from nonattainment to attainment with the CO NAAQS. On February 24, 2007, U.S. EPA published in the Federal Register its proposed decision to re-designate the Basin from nonattainment to attainment for CO. The comment period on the re-designation proposal closed on March 16, 2007 with no comments received by the U.S. EPA. On May 11, 2007, U.S. EPA published in the Federal Register its final decision to approve SCAQMD's request for re-designation from non-attainment to attainment for CO, effective June 11, 2007.

On August 12, 2011 U.S. EPA issued a decision to retain the existing NAAQS for CO, determining that those standards provided the required level of public health protection. However, U.S. EPA added a monitoring requirement for near-road CO monitors in urban areas with population of one million or more, utilizing stations that would be implemented to meet the 2010 NO2 near-road monitoring requirements. The two new CO monitors are at the I-5 near-road site, located in Orange County near Anaheim, and the I-10 near-road site, located near Etiwanda Avenue in San Bernardino County near Ontario, Rancho Cucamonga and Fontana.

The near-road CO measurements began at these two locations in late December 2014. From that time to the end of 2015, the preliminary data shows that while the near-road measurements were often higher than the nearest ambient monitors, as would be expected in the near-road environment, they did not exceed the levels of the 1-hour or 8-hour CO NAAQS. The preliminary 2015 near-road peak 1-hour CO concentration measured was 2.6 ppm, measured at the I-10 near-road site, while the peak 8-hour CO concentration was 3.1 ppm at the I-5 near-road site, both well below the respective NAAQS levels (35 ppm and 9 ppm, respectively). Based on this limited period of data, it appears that the near-road CO design values will be unlikely to affect the Basin's attainment status for the state and federal CO standards.

Ozone

Ozone (O3), a colorless gas with a sharp odor, is a highly reactive form of oxygen. High ozone concentrations exist naturally in the stratosphere. Some mixing of stratospheric ozone downward through the troposphere to the earth's surface does occur; however, the extent of ozone transport is limited. At the earth's surface in sites remote from urban areas ozone concentrations are normally very low (e.g., from 0.03 ppm to 0.05 ppm).

The propensity of ozone for reacting with organic materials causes it to be damaging to living cells and ambient ozone concentrations in the Basin are frequently sufficient to cause health effects. Ozone enters the human body primarily through the respiratory tract and causes respiratory irritation and discomfort, makes breathing more difficult during exercise, and reduces the respiratory system's ability to remove inhaled particles and fight infection.

Individuals exercising outdoors, children and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible subgroups for ozone effects. Short-term exposures (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in high ozone communities. Elevated ozone levels are also associated with increased school absences.

Ozone exposure under exercising conditions is known to increase the severity of the above mentioned observed responses. Animal studies suggest that exposures to a combination of pollutants which include ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

In 2015, SCAQMD regularly monitored ozone concentrations at 29 locations in the Basin and the Coachella Valley portion of the Salton Sea Air Basin. Maximum ozone concentrations for all areas monitored were below the stage 1 episode level (0.20 ppm) and below the health advisory level (0.15 ppm) (see Table 3-3). All counties in the Basin, as well as the Coachella Valley, exceeded the level of the new 2015 (0.070 ppm), the former 2008 (0.075 ppm), and/or the 1997 (0.08 ppm) 8-hour ozone NAAQS in 2015. While not all stations had days exceeding the previous 8-hour standards, all monitoring stations had at least one day over the 2015 federal standard.

In 2015, the maximum ozone concentrations in the Basin continued to exceed federal standards by wide margins. Maximum 1-hour and 8-hour average ozone concentrations were 0.144 ppm and 0.107 ppm, respectively (the maximum 1-hour and 8-hour average was recorded in the Central San Bernardino Mountain area). The maximum 8-hour concentration of 0.127 ppm was 181 percent of the new federal standard. The maximum 1-hour concentration was 160 percent of the 1-hour state ozone standard of 0.09 ppm. The 8-hour average concentration was 160 percent of the 8-hour state ozone standard of 0.070 ppm.

Nitrogen Dioxide

NO2 is a reddish-brown gas with a bleach-like odor. Nitric oxide (NO) is a colorless gas, formed from the nitrogen (N2) and oxygen (O2) in air under conditions of high temperature and pressure which are generally present during combustion of fuels; NO reacts rapidly with the oxygen in air to form NO2. NO2 is responsible for the brownish tinge of polluted air. The two gases, NO and NO2, are referred to collectively as NOx. In the presence of sunlight, NO2 reacts to form nitric oxide and an oxygen atom. The oxygen atom can react further to form ozone, via a complex series of chemical reactions involving hydrocarbons. Nitrogen dioxide may also react to form nitric acid (HNO3) which reacts further to form nitrates, components of PM2.5 and PM10.

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposures to NO2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma and/or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these subgroups. More recent studies have found associations between NO2 exposures and cardiopulmonary mortality, decreased lung function, respiratory symptoms and emergency room asthma visits.

In animals, exposure to levels of NO2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO2.

In 2015, nitrogen dioxide concentrations were monitored at 24 locations. No area of the Basin or Salton Sea Air Basin exceeded the federal or state standards for NO2. The Basin has not exceeded the federal standard for NO2 (0.0534 ppm) since 1991, when the Los Angeles County portion of the Basin recorded the last exceedance of the standard in any county within the United States. The current 1-hour average NO2 NAAQS (100 ppb) was last exceeded on two days in 2014 in the South Coastal Los Angeles County area at the Long Beach-Hudson air monitoring station. However, the 98th percentile form of the standard was not exceeded and the 2013-2015 design value is not in violation of the NAAQS. The higher relative concentrations in the Los Angeles area are indicative of the concentrated emission sources, especially heavy-duty vehicles. NOx emission reductions continue to be necessary because it is a precursor to both ozone and PM (PM2.5 and PM10) concentrations.

With the revised NO2 federal standard in 2010, near-road NO2 measurements were required to be phased in for larger cities. The four near-road monitoring stations are: (1) I-5 near-road, located in Orange County near Anaheim; (2) I-710 near-road, located at Long Beach Blvd. in Los Angeles County near Compton and Long Beach; (3) SR-60 near-road, located west of Vineyard Avenue near the San Bernardino/Riverside County border near Ontario, Mira Loma and Upland; and (4) I-10 near-road, located near Etiwanda Avenue in San Bernardino County near Ontario, Rancho Cucamonga and Fontana.

The longest operating near-road station in the Basin, adjacent to I-5 in Orange County, has not exceeded the level of the 1-hour NO2 NAAQS (100 ppb) since the measurements began on January 1, 2014. The peak 1-hour NO2 concentration at that site in 2014 was 78.8 ppb and the peak concentration for 2015 was 70.2 ppb. This can be compared to the annual peak values measured at the nearest ambient monitoring station in Central Orange County (Anaheim station), where the 2014 and 2015 peaks were 75.8 and 59.1, respectively. In terms of the design value form of the NAAQS, the 98th percentile daily maximum 1-hour concentrations at the Anaheim near-road site were 66.0 ppb and 61.4 ppb, respectively, for 2014 and 2015, compared to 59.8 ppb and 54.6 ppb from the Anaheim ambient monitoring station. The annual average NO2 NAAQS (0.053 ppm, or 53 ppb) was also not exceeded. Thus, while the Anaheim near-road NO2 measurements are higher than the ambient Orange County measurements, as would be expected close to traffic emissions sources, it does not appear that NO2 design values will violate the NAAQS or CAAQS at this location. Likewise, the shorter period of data available from the remaining three near-road stations indicates that these locations will also likely measure higher NO2 than the nearest ambient stations, but they have not exceeded the level of the 1-hour or annual NO2 NAAQS or CAAQS through the end of 2015. Based on this limited period of data, it appears that the near-road NO2 measurements will be unlikely to affect the Basin's attainment status for the state and federal NO2 standards.

Sulfur Dioxide

SO2 is a colorless gas with a sharp odor. It reacts in the air to form sulfuric acid (H2SO4), which contributes to acid precipitation, and sulfates, which are components of PM10 and PM2.5. Most of the SO2 emitted into the atmosphere is produced by burning sulfur-containing fuels.

Exposure of a few minutes to low levels of SO2 can result in airway constriction in some asthmatics. All asthmatics are sensitive to the effects of SO2. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, is observed after acute higher exposure to SO2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO2.

Animal studies suggest that despite SO2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO2 levels. In these studies, efforts to separate the effects of SO2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

No exceedances of federal or state standards for sulfur dioxide occurred in 2015 at any of the six locations monitored the Basin. The maximum 1-hour SO2 concentration was 37.5 ppb, as recorded in the South Coastal Los Angeles County area. The maximum 24-hour SO2 concentration was 11.8 ppb, as recorded in South Coastal Los Angeles County area. Though SO2 concentrations remain well below the standards, SO2 is a precursor to sulfate, which is a component of fine particulate matter, PM10, and PM2.5. Historical measurements showed concentrations to be well below standards and monitoring has been discontinued.

Particulate Matter (PM10 and PM2.5)

Of great concern to public health are the particles small enough to be inhaled into the deepest parts of the lung. Respirable particles (particulate matter less than about 10 micrometers in diameter (PM10)) can accumulate in the respiratory system and aggravate health problems such as asthma, bronchitis and other lung diseases. Children, the elderly, exercising adults, and those suffering from asthma are especially vulnerable to adverse health effects of PM10 and PM2.5.

A consistent correlation between elevated ambient fine particulate matter (PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. Studies have reported an association between long-term exposure to air pollution dominated by PM2.5 and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in fine particulate matter concentration levels have also been related to hospital admissions for acute respiratory conditions, to school and kindergarten absences, to a decrease in respiratory function in normal children and to increased medication use in children and adults with asthma. Studies have also shown lung function growth in children is reduced with long-term exposure to particulate matter. In addition to children, the elderly, and people with preexisting respiratory and/or cardiovascular disease appear to be more susceptible to the effects of PM10 and PM2.5.

SCAQMD monitored PM10 concentrations at 19 locations in 2015. The federal 24-hour PM10 standard (150 µg/m3) was not exceeded in 2015. The Basin has remained in attainment of the PM10 NAAQS since 2006. The maximum three-year average 24-hour PM10 concentration of 145 µg/m3 was recorded in the Coachella Valley area and was 97 percent of the federal standard and 290 percent of the much more stringent state 24-hour PM10 standard (50 µg/m3). The state 24-

hour PM10 standard was exceeded at several of the monitoring stations. The maximum annual average PM10 concentration of 43.3 µg/m3 was recorded in the Mira Loma area. The latest three-year annual average PM10 concentration of 44.1 µg/m3 was recorded in the San Gabriel Valley (based on 2012 through 2014 monitoring data). The federal annual PM10 standard has been revoked. The much more stringent state annual PM10 standard (20 µg/m3) was exceeded in most stations in each county in the Basin and in the Coachella Valley.

In 2015, PM2.5 concentrations were monitored at 17 locations throughout the Basin. U.S. EPA revised the federal 24-hour PM2.5 standard from 65 µg/m3 to 35 µg/m3, effective December 17, 2006. In 2015, the maximum PM2.5 concentrations in the Basin exceeded the new federal 24-hour PM2.5 standard in all but three locations. The maximum 24-hour PM2.5 concentration of 70.3 µg/m3 was recorded in the East San Gabriel Valley area. The 98th percentile 24-hour PM2.5 concentration of 43.2 µg/m3 was recorded in the Mira Loma area, which exceeds the federal standard of 35 µg/m3. The maximum annual average concentration of 13.34 µg/m3 was recorded in Mira Loma, which represents 89 percent of the 2006 federal standard of 15 µg/m3. The 3-year high state annual average PM2.5 concentration of 19 µg/m3 was recorded in Metropolitan Riverside County (based on 2013 through 2015 monitoring), which represents 158 percent of the state standard of 12 µg/m3.

On December 14, 2012, U.S. EPA strengthened the annual NAAQS for PM2.5 to 12 µg/m3 and, as part of the revisions, a requirement was added to monitor near the most heavily trafficked roadways in large urban areas. Particle pollution is expected to be higher along these roadways as a result of direct emissions from cars and heavy-duty diesel trucks and buses. SCAQMD has installed the two required PM2.5 monitors by January 1, 2015, at locations selected based upon the existing near-roadway NO2 sites that were ranked higher for heavy-duty diesel traffic. The locations are: (1) I-710, located at Long Beach Blvd. in Los Angeles County near Compton and Long Beach; and (2) SR-60, located west of Vineyard Avenue near the San Bernardino/Riverside County border near Ontario, Mira Loma and Upland. These near-road sites measure PM2.5 daily with FRM filter-based measurements.

The preliminary 2015 PM2.5 annual averages from the I-710 and SR-60 Near-road sites were 12.89 and 14.48 µg/m3, respectively. The nearby ambient stations in South Coastal Los Angeles County (North Long Beach Station) and in Metropolitan Riverside County (Mira Loma station) measured 12.81 and 13.34 µg/m3, respectively, for the preliminary 2015 annual average. Thus, the preliminary PM2.5 measurements from these sites for 2015 indicate that the near-road sites do indeed measure higher than the nearby ambient stations, on average. If this pattern holds for the long term, the SR-60 near-road station could potentially become the three-year design value site for the Basin for the PM2.5 annual average NAAQS, once sufficient data is collected.

While it reasonably could be expected that the highest near-road site would also become the Basin-maximum design value site for the 24-hour PM2.5 NAAQS, this may not be the case for the Basin. The 2015 98th percentile 24-hour PM2.5 concentration is higher at the I-710 near-road than at the nearby North Long Beach station. However, the 98th percentile 24-hour concentration remains higher at Mira Loma (43.2 µg/m3) than at the SR-60 Near-road site (39.9 µg/m3). The number of days over the 24-hour PM2.5 NAAQS was also significantly higher at the Mira Loma station, with

17 days over the 24-hour NAAQS compared to 10 days at the SR-60 near-road site. PM2.5 24-hour concentrations at the Mira Loma station are likely higher than the near-road site on the highest days, due to the influence of enhanced secondary particle formation at Mira Loma.

Lead

Lead in the atmosphere is present as a mixture of a number of lead compounds. Leaded gasoline and lead smelters have been the main sources of lead emitted into the air. Due to the phasing out of leaded gasoline, there was a dramatic reduction in atmospheric lead in the Basin over the past three decades.

Fetuses, infants, and children are more sensitive than others to the adverse effects of lead exposure. Exposure to low levels of lead can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased lead levels are associated with increased blood pressure.

Lead poisoning can cause anemia, lethargy, seizures, and death. It appears that there are no direct effects of lead on the respiratory system. Lead can be stored in the bone from early-age environmental exposure, and elevated blood lead levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland), and osteoporosis (breakdown of bone tissue). Fetuses and breast-fed babies can be exposed to higher levels of lead because of previous environmental lead exposure of their mothers.

The state standards for lead were not exceeded in any area of the SCAQMD in 2015. There have been no violations of these standards at SCAQMD's regular air monitoring stations since 1982, as a result of removal of lead from gasoline. However, monitoring at two stations immediately adjacent to stationary sources of lead recorded exceedances of the standard in Los Angeles County over the 2007-2009 time period. These data were used for designations under the revised standard that also included new requirements for near-source monitoring. As a result, a nonattainment designation was finalized for much of the Los Angeles County portion of the Basin when the current standard was implemented.

The current lead concentrations in Los Angeles County are now below the NAAQS. The maximum quarterly average lead concentration (0.01 µg/m3 at several monitoring) was seven percent of the federal quarterly average lead standard (0.15 µg/m3). The maximum monthly average lead concentration (0.014 µg/m3 in South San Gabriel and South Central Los Angeles County) was one percent of the state monthly average lead standard. As a result of the 2012-2014 design value below the NAAQS, SCAQMD will be requesting that U.S. EPA re-designate the nonattainment area as attaining the federal lead standard. Stringent SCAQMD rules governing lead-producing sources will help to ensure that there are no future violations of the federal standard. Furthermore, one business that had been responsible for the highest measured lead concentrations in Los Angeles County has closed and is in the process of demolition and site clean-up.

Sulfates

Sulfates are chemical compounds which contain the sulfate ion and are part of the mixture of solid materials which make up PM10. Most of the sulfates in the atmosphere are produced by oxidation of SO2. Oxidation of sulfur dioxide yields sulfur trioxide (SO3) which reacts with water to form sulfuric acid, which contributes to acid deposition. The reaction of sulfuric acid with basic substances such as ammonia yields sulfates, a component of PM10 and PM2.5.

Most of the health effects associated with fine particles and SO2 at ambient levels are also associated with sulfates. Thus, both mortality and morbidity effects have been observed with an increase in ambient sulfate concentrations. However, efforts to separate the effects of sulfates from the effects of other pollutants have generally not been successful.

Clinical studies of asthmatics exposed to sulfuric acid suggest that adolescent asthmatics are possibly a subgroup susceptible to acid aerosol exposure. Animal studies suggest that acidic particles such as sulfuric acid aerosol and ammonium bisulfate are more toxic than nonacidic particles like ammonium sulfate. Whether the effects are attributable to acidity or to particles remains unresolved.

The most current data available for sulfates is for 2014. In 2014, the state 24-hour sulfate standard (25 µg/m3) was not exceeded in any of the 20 monitoring locations in the Basin. The maximum 24-hour sulfate concentration was 14.3 ppb, as recorded in the Central Los Angeles County area. There are no federal sulfate standards.

Vinyl Chloride

Vinyl chloride is a colorless, flammable gas at ambient temperature and pressure. It is also highly toxic and is classified by the American Conference of Governmental Industrial Hygienists (ACGIH) as A1 (confirmed carcinogen in humans) and by the International Agency for Research on Cancer (IARC) as 1 (known to be a human carcinogen) (Air Gas, 2010). At room temperature, vinyl chloride is a gas with a sickly sweet odor that is easily condensed. However, it is stored as a liquid. Due to the hazardous nature of vinyl chloride to human health there are no end products that use vinyl chloride in its monomer form. Vinyl chloride is a chemical intermediate, not a final product. It is an important industrial chemical chiefly used to produce polymer polyvinyl chloride (PVC). The process involves vinyl chloride liquid fed to polymerization reactors where it is converted from a monomer to a polymer PVC. The final product of the polymerization process is PVC in either a flake or pellet form. Billions of pounds of PVC are sold on the global market each year. From its flake or pellet form, PVC is sold to companies that heat and mold the PVC into end products such as PVC pipe and bottles.

In the past, vinyl chloride emissions have been associated primarily with sources such as landfills. Risks from exposure to vinyl chloride are considered to be a localized impacts rather than regional impacts. Because landfills in the SCAQMD are subject to Rule 1150.1 – Control of Gaseous Emissions from Municipal Solid Waste Landfills, which contains stringent requirements for landfill gas collection and control, potential vinyl chloride emissions are expected to be below the level of detection. Therefore, SCAQMD does not monitor for vinyl chloride at its monitoring stations.

Volatile Organic Compounds

It should be noted that there are no state or national ambient air quality standards for VOCs because they are not classified as criteria pollutants. VOCs are regulated, however, because limiting VOC emissions reduces the rate of photochemical reactions that contribute to the formation of ozone. VOCs are also transformed into organic aerosols in the atmosphere, contributing to higher PM10 and lower visibility levels.

Although health-based standards have not been established for VOCs, health effects can occur from exposures to high concentrations of VOCs because of interference with oxygen uptake. In general, ambient VOC concentrations in the atmosphere are suspected to cause coughing, sneezing, headaches, weakness, laryngitis, and bronchitis, even at low concentrations. Some hydrocarbon components classified as VOC emissions are thought or known to be hazardous. Benzene, for example, one hydrocarbon component of VOC emissions, is known to be a human carcinogen.

Non-Criteria Pollutants

Although SCAQMD's primary mandate is attaining the state and NAAQS for criteria pollutants within the Basin, SCAQMD also has a general responsibility pursuant to Health and Safety Code § 41700 to control emissions of air contaminants and prevent endangerment to public health. Additionally, state law requires SCAQMD to implement airborne toxic control measures (ATCM) adopted by CARB and to implement the Air Toxics "Hot Spots" Act. As a result, SCAQMD has regulated pollutants other than criteria pollutants such as TACs, greenhouse gases and stratospheric ozone depleting compounds. SCAQMD has developed a number of rules to control non-criteria pollutants from both new and existing sources. These rules originated through state directives, CAA requirements, or SCAQMD rulemaking process.

In addition to promulgating non-criteria pollutant rules, SCAQMD has been evaluating AQMP control measures as well as existing rules to determine whether or not they would affect, either positively or negatively, emissions of non-criteria pollutants. For example, rules in which VOC components of coating materials are replaced by a non-photochemically reactive chlorinated substance would reduce the impacts resulting from ozone formation, but could increase emissions of toxic compounds or other substances that may have adverse impacts on human health.

The following subsections summarize the existing setting for the two major categories of non-criteria pollutants: compounds that contribute to TACs, global climate change, and stratospheric ozone depletion.

Air Quality – Toxic Air Contaminants

Federal

Under Section 112 of the CAA, U.S. EPA is required to regulate sources that emit one or more of the 187 federally listed hazardous air pollutants (HAPs). HAPs are air toxic pollutants identified in the CAA, which are known or suspected of causing cancer or other serious health effects. The federal HAPs are listed on the U.S. EPA website at http://www.epa.gov/ttn/atw/orig189.html. In order to implement the CAA, approximately 100 National Emission Standards for Hazardous Air Pollutants (NESHAPs) have been promulgated by U.S. EPA for major sources (sources emitting greater than 10 tpy of a single HAP or greater than 25 tpy of multiple HAPs). SCAQMD can either directly implement NESHAPs or adopt rules that contain requirements at least as stringent as the NESHAP requirements. However, since NESHAPs often apply to sources in the Basin that are controlled, many of the sources that would have been subject to federal requirements already comply or are exempt.

In addition to the major source NESHAPs, U.S. EPA has also controlled HAPs from urban areas by developing Area Source NESHAPs under their Urban Air Toxics Strategy. U.S. EPA defines an area source as a source that emits less than 10 tons annually of any single hazardous air pollutant or less than 25 tons annually of a combination of hazardous air pollutants. The CAA requires the U.S. EPA to identify a list of at least 30 air toxics that pose the greatest potential health threat in urban areas. U.S. EPA is further required to identify and establish a list of area source categories that represent 90 percent of the emissions of the 30 urban air toxics associated with area sources, for which Area Source NESHAPs are to be developed under the CAA. U.S. EPA has identified a total of 70 area source categories with regulations promulgated for more than 30 categories so far.

The federal toxics program recognizes diesel engine exhaust (diesel particulate matter or DPM) as a health hazard, however, DPM itself is not one of their listed toxic air contaminants. Rather, each toxic compound in the speciated list of compounds in exhaust is considered separately. Although there are no specific NESHAP regulations for DPM, DPM reductions are realized through federal regulations including diesel fuel standards and emission standards for stationary, marine, and locomotive engines; and idling controls for locomotives.

State

The California air toxics program was based on the CAA and the original federal list of hazardous air pollutants. The state program was established in 1983 under the Toxic Air Contaminant Identification and Control Act, Assembly Bill (AB) 1807, Tanner. Under the state program, toxic air contaminants are identified through a two-step process of risk identification and risk management. This two-step process was designed to protect residents from the health effects of toxic substances in the air.

Control of TACs under the TAC Identification and Control Program: California's TAC identification and control program, adopted in 1983 as AB 1807, is a two-step program in which substances are identified as TACs and ATCMs are adopted to control emissions from specific sources. CARB has adopted a regulation designating all 188 federal hazardous air pollutants (HAPs) as TACs.

ATCMs are developed by CARB and implemented by SCAQMD and other air districts through the adoption of regulations of equal or greater stringency. Generally, the ATCMs reduce emissions to achieve exposure levels below a determined health threshold. If no such threshold levels are determined, emissions are reduced to the lowest level achievable through the best available control technology unless it is determined that an alternative level of emission reduction is adequate to protect public health.

Under California law, a federal NESHAP automatically becomes a state ATCM, unless CARB has already adopted an ATCM for the source category. Once a NESHAP becomes an ATCM, CARB and each air pollution control or air quality management district have certain responsibilities related to adoption or implementation and enforcement of the NESHAP/ATCM.

Control of TACs under the Air Toxics "Hot Spots" Act: The Air Toxics Hot Spots Information and Assessment Act of 1987 (AB 2588) establishes a statewide program to inventory and assess the risks from facilities that emit TACs and to notify the public about significant health risks associated with the emissions. Facilities are phased into the AB 2588 program based on their emissions of criteria pollutants or their occurrence on lists of toxic emitters compiled by SCAQMD. Phase I consists of facilities that emit over 25 tons per year of any criteria pollutant and facilities present on SCAQMD's toxics list. Phase I facilities entered the program by reporting their TAC emissions for calendar year 1989. Phase II consists of facilities that emit between 10 and 25 tpy of any criteria pollutant, and submitted air toxic inventory reports for calendar year 1990 emissions. Phase III consists of certain designated types of facilities which emit less than 10 tons per year of any criteria pollutant, and submitted inventory reports for calendar year 1991 emissions. Inventory reports are required to be updated every four years under the state law.

Air Toxics Control Measures: As part of its risk management efforts, CARB has passed state ATCMs to address air toxics from mobile and stationary sources. Some key ATCMs for stationary sources include reductions of benzene emissions from service stations, hexavalent chromium emissions from chrome plating, perchloroethylene emissions from dry cleaning, ethylene oxide emissions from sterilizers, and multiple air toxics from the automotive painting and repair industries.

Many of CARB’s recent ATCMs are part of the CARB Risk Reduction Plan to Reduce Particulate Matter Emissions from Diesel-Fueled Engines and Vehicles (Diesel Risk Reduction Plan) which was adopted in September 2000 (http://www.arb.ca.gov/diesel/documents/rrpapp.htm) with the goal of reducing DPM emissions from compression ignition engines and associated health risk by 75 percent by 2010 and 85 percent by 2020. The Diesel Risk Reduction Plan includes strategies to reduce emissions from new and existing engines through the use of ultra-low sulfur diesel fuel, add-on controls, and engine replacement. In addition to stationary source engines, the plan addresses DPM emissions from mobile sources such as trucks, buses, construction equipment, locomotives, and ships.

OEHHA Health Risk Assessment Guidelines: In 2003, OEHHA developed and approved its Health Risk Assessment Guidance document (2003 OEHHA Guidelines) and prepared a series of Technical Support Documents, reviewed and approved by the Scientific Review Panel (SRP), that provided new scientific information showing that early-life exposures to air toxics contribute to an increased estimated lifetime risk of developing cancer and other adverse health effects, compared to exposures that occur in adulthood. As a result, OEHHA developed the Revised OEHHA Guidelines in March 2015 which incorporated this new scientific information. The new method utilizes higher estimates of cancer potency during early life exposures. There are also differences in the assumptions on breathing rates and length of residential exposures.

SCAQMD

SCAQMD has regulated criteria air pollutants using either a technology-based or an emissions limit approach. The technology-based approach defines specific control technologies that may be installed to reduce pollutant emissions. The emissions limit approach establishes an emission limit, and allows industry to use any emission control equipment, as long as the emission requirements are met. The regulation of TACs often uses a health risk-based approach, but may also require a regulatory approach similar to criteria pollutants, as explained in the following subsections.

Rules and Regulations: Under SCAQMD's toxic regulatory program there are 23 source-specific rules that target toxic emission reductions that regulate over 10,000 sources such as metal finishing, spraying operations, dry cleaners, film cleaning, gasoline dispensing, and diesel-fueled stationary engines to name a few. In addition, other source-specific rules targeting criteria pollutant reductions also reduce toxic emissions, such as Rule 461 – Gasoline Transfer and Dispensing which reduces benzene emissions from gasoline dispensing and Rule 1124 – Aerospace Assembly and Component Manufacturing Operations which reduces perchloroethylene, trichloroethylene, and methylene chloride emissions from aerospace operations.

New and modified sources of toxic air contaminants in the SCAQMD are subject to Rule 1401 - New Source Review of Toxic Air Contaminants and Rule 212 - Standards for Approving Permits. Rule 212 requires notification of SCAQMD's intent to grant a permit to construct a significant project, defined as a new or modified permit unit located within 1000 feet of a school (a state law requirement under AB 3205), a new or modified permit unit posing a maximum individual cancer risk of one in one million (1×10^6) or greater, or a new or modified facility with criteria pollutant emissions exceeding specified daily maximums. Distribution of notice is required to all addresses within a quarter mile radius, or other area deemed appropriate by SCAQMD. Rule 1401 currently controls emissions of carcinogenic and non-carcinogenic (health effects other than cancer) air contaminants from new, modified and relocated sources by specifying limits on cancer risk and hazard index (explained further in the following discussion), respectively. The rule lists nearly 300 TACs that are evaluated during SCAQMD's permitting process for new, modified or relocated sources. During the past decade, more than ten compounds have been added or had risk values amended. The addition of DPM from diesel-fueled internal combustion engines as a TAC in March 2008 was the most significant of recent amendments to the rule. Rule 1401.1 –

Requirements for New and Relocated Facilities Near Schools sets risk thresholds for new and relocated facilities near schools. The requirements are more stringent than those for other air toxics rules in order to provide additional protection to school children.

Air Toxics Control Plan: On March 17, 2000, the SCAQMD Governing Board approved the Air Toxics Control Plan (2000 ATCP) which was the first comprehensive plan in the nation to guide future toxic rulemaking and programs. The ATCP was developed to lay out SCAQMD's air toxics control program which built upon existing federal, state, and local toxic control programs as well as co-benefits from implementation of SIP measures. The concept for the plan was an outgrowth of the Environmental Justice principles and the Environmental Justice Initiatives adopted by SCAQMD Governing Board on October 10, 1997. Monitoring studies and air toxics regulations that were created from these initiatives emphasized the need for a more systematic approach to reducing toxic air contaminants. The intent of the plan was to reduce exposure to air toxics in an equitable and cost-effective manner that promotes clean, healthful air in the SCAQMD. The plan proposed control strategies to reduce TACs in the SCAQMD implemented between years 2000 and 2010 through cooperative efforts of SCAQMD, local governments, CARB and U.S. EPA.

Cumulative Impact Reduction Strategies (CIRS): The CIRS was presented to the SCAQMD Governing Board on September 5, 2003 as part of the White Paper on Regulatory Options for Addressing Cumulative Impacts from Air Pollution Emissions. The resulting 25 cumulative impacts strategies were a key element of the Addendum to March 2000 Final Draft Air Toxics Control Plan for Next Ten Years (2004 Addendum). The strategies included rules, policies, funding, education, and cooperation with other agencies. Some of the key SCAQMD accomplishments related to the cumulative impacts reduction strategies were:

- Rule 1401.1 which set more stringent health risk requirements for new and relocated facilities near schools
- Rule 1470 – Requirements for Stationary Diesel-Fueled Internal Combustion and Other Compression Ignition Engines which established DPM emission limits and other requirements for diesel-fueled engines
- Rule 1469.1 – Spraying Operations Using Coatings Containing Chromium which regulated chrome spraying operations
- Rule 410 – Odor from Transfer Stations and Material Recovery Facilities which addresses odors from transfer stations and material recovery facilities
- Intergovernmental Review comment letters for CEQA documents
- SCAQMD's land use guidance document
- Additional protection in toxics rules for sensitive receptors, such as more stringent requirements for chrome plating operations and diesel engines located near schools

2004 Addendum: The 2004 Addendum was adopted by the SCAQMD Governing Board on April 2, 2004 and served as a status report regarding implementation of the various mobile and stationary source strategies in the 2000 ATCP and introduced new measures to further address air toxics. The main elements of the 2004 Addendum were to address the progress made in the implementation of the 2000 ATCP control strategies provide a historical perspective of air toxic emissions and current air toxic levels; incorporate the CIRS approved in 2003 and additional measures identified in the 2003 AQMP; project future air toxic levels to the extent feasible; and summarize future efforts to develop the next ATCP. Significant progress had been made in implementing most of SCAQMD strategies from the 2000 ATCP and the 2004 Addendum. CARB has also made notable progress in mobile source measures via its Diesel Risk Reduction Plan, especially for goods movement related sources, while the U.S. EPA continued to implement their air toxic programs applicable to stationary sources.

Clean Communities Plan: On November 5, 2010, the SCAQMD Governing Board approved the 2010 Clean Communities Plan (CCP). The CCP was an update to the 2000 ATCP and the 2004 Addendum. The objective of the 2010 CCP was to reduce the exposure to air toxics and air-related nuisances throughout the SCAQMD, with emphasis on cumulative impacts. The elements of the 2010 CCP are community exposure reduction, community participation, communication and outreach, agency coordination, monitoring and compliance, source-specific programs, and nuisance. The centerpiece of the 2010 CCP is a pilot study through which SCAQMD staff works with community stakeholders to identify and develop solutions community-specific to air quality issues in two communities: (1) the City of San Bernardino; and (2) Boyle Heights and surrounding areas.

Control of TACs under the Air Toxics "Hot Spots" Act: On October 2, 1992, the SCAQMD Governing Board adopted public notification procedures for Phase I and II facilities. These procedures specify that AB 2588 facilities must provide public notice when exceeding the following risk levels:

- Maximum Individual Cancer Risk: greater than 10 in one million ($10 \text{ x } 10^{6}$)
- Total Hazard Index: greater than 1.0 for TACs except lead, or > 0.5 for lead

Public notice is to be provided by letters mailed to all addresses and all parents of children attending school in the impacted area. In addition, facilities must hold a public meeting and provide copies of the facility risk assessment in all school libraries and a public library in the impacted area.

The AB 2588 Toxics "Hot Spots" Program is implemented through Rule 1402 - Control of Toxic Air Contaminants from Existing Sources. SCAQMD continues to review health risk assessments submitted. Notification is required from facilities with a significant risk under the AB 2588 program based on their initial approved health risk assessments and will continue on an ongoing basis as additional and subsequent health risk assessments are reviewed and approved.

There are currently about 361 facilities in SCAQMD's AB 2588 program. Since 1992 when the state Health and Safety Code incorporated a risk reduction requirement in the program, SCAQMD has reviewed and approved over 335 HRAs; 50 facilities were required to do a public notice and 24 facilities were subject to risk reduction. Currently, over 96 percent of the facilities in the program have cancer risks below ten in a million and over 97 percent have acute and chronic hazard indices of less than one (SCAQMD, 2015a).

CEQA Intergovernmental Review Program: SCAQMD staff, through its Intergovernmental Review (IGR) provides comments to lead agencies on air quality analyses and mitigation measures in CEQA documents. The following are some key programs and tools that have been developed more recently to strengthen air quality analyses, specifically as they relate to exposure of mobile source air toxics:

- SCAQMD's Mobile Source Committee approved the "Health Risk Assessment Guidance for Analyzing Cancer Risks from Mobile Source Diesel Emissions" (August 2002). This document provides guidance for analyzing cancer risks from DPM from truck idling and movement (e.g., truck stops, warehouse and distribution centers, or transit centers), ship hoteling at ports, and train idling.
- CalEPA and CARB's "Air Quality and Land Use Handbook: A Community Health Perspective" (April 2005), provides recommended siting distances for incompatible land uses.
- Western Riverside Council of Governments' Regional Air Quality Task Force developed a policy document titled, "Good Neighbor Guidelines for Siting New and/or Modified Warehouse/Distribution Facilities" (September 2005). This document provides guidance to local government on preventive measures to reduce neighborhood exposure to toxic air contaminants from warehousing facilities.

Environmental Justice (EJ): Environmental justice has long been a focus of SCAQMD. In 1990, SCAQMD formed an Ethnic Community Advisory Group that was restructured as the Environmental Justice Advisory Group (EJAG) in 2008. EJAG's mission is to advise and assist SCAQMD in protecting and improving public health in SCAQMD's most impacted communities through the reduction and prevention of air pollution.

In 1997, the SCAQMD Governing Board adopted four guiding principles and ten initiatives (http://www.aqmd.gov/ej/history.htm) to ensure environmental equity. Also in 1997, the SCAQMD Governing Board expanded the initiatives to include the "Children's Air Quality Agenda" focusing on the disproportionate impacts of poor air quality on children. Some key initiatives that have been implemented were the Multiple Air Toxics Exposure Studies (MATES, MATES II, MATES III, and MATES IV); the Clean Fleet Rules; CIRS; funding for lower emitting technologies under the Carl Moyer Program; the Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning; a guidance document on Air Quality Issues in School Site Selection; and the 2000 ATCP and its 2004 Addendum. Key initiatives focusing on communities and residents include the Clean Air Congress; the Clean School Bus Program; Asthma and Air Quality Consortium; Brain and Lung Tumor and Air Pollution Foundation; air quality presentations to schools and community and civic groups; and Town Hall meetings. Technological and scientific projects and programs have been a large part of SCAQMD's EJ program since its inception. Over time, the EJ program's focus on public education, outreach, and opportunities for public participation have greatly increased. Public education materials and other resources for the public are available on SCAQMD's website (www.aqmd.gov)

AB 2766 Subvention Funds: AB 2766 subvention funds, money collected by the state as part of vehicle registration and passed through to SCAQMD, is used to fund projects in local cities that reduce motor vehicle air pollutants. The Clean Fuels Program, funded by a surcharge on motor vehicle registrations in SCAQMD, reduces TAC emissions through co-funding projects that develop and demonstrate low-emission clean fuels and advanced technologies, and to promote commercialization and deployment of promising or proven technologies in Southern California.

Carl Moyer Program: Another program that targets diesel emission reductions is the Carl Moyer Program which provides grants for projects that achieve early or extra emission reductions beyond what is required by regulations. Examples of eligible projects include cleaner on-road, off-road, marine, locomotive, and stationary agricultural pump engines. Other endeavors of SCAQMD's Technology Advancement Office help to reduce DPM emissions through co-funding research and demonstration projects of clean technologies, such as low-emitting locomotives.

Control of TACs with Risk Reduction Audits and Plans: Senate Bill (SB) 1731, enacted in 1992 and codified in Health and Safety Code § 44390 et seq., amended AB 2588 to include a requirement for facilities with significant risks to prepare and implement a risk reduction plan which will reduce the risk below a defined significant risk level within specified time limits. SCAQMD Rule 1402 was adopted on April 8, 1994 to implement the requirements of SB 1731.

In addition to the TAC rules adopted by SCAQMD under authority of AB 1807 and SB 1731, SCAQMD has adopted source-specific TAC rules, based on the specific level of TAC emitted and the needs of the area. These rules are similar to the state's ATCMs because they are source-specific and only address emissions and risk from specific compounds and operations.

Multiple Air Toxics Exposure Studies

<u>Multiple Air Toxics Exposure Study (MATES):</u> In 1986, SCAQMD conducted the first MATES report to determine the Basin-wide risks associated with major airborne carcinogens. At the time, the state of technology was such that only 20 known air toxic compounds could be analyzed and diesel exhaust particulate did not have an agency accepted carcinogenic health risk value. TACs are determined by U.S. EPA, and by CalEPA, including OEHHA and CARB. For purposes of MATES, the California carcinogenic health risk factors were used. The maximum combined individual health risk for simultaneous exposure to pollutants under the study was estimated to be 600 to 5,000 in one million.

<u>Multiple Air Toxics Exposure Study II (MATES II):</u> At its October 10, 1997 meeting, the SCAQMD Governing Board directed staff to conduct a follow up to the MATES report to quantify the magnitude of population exposure risk from existing sources of selected air toxic contaminants at that time. MATES II included a monitoring program of 40 known air toxic compounds, an updated emissions inventory of toxic air contaminants (including microinventories around each of the 14 microscale sites), and a modeling effort to characterize health risks from hazardous air pollutants. The estimated Basin-wide carcinogenic health risk from ambient measurements was 1,400 per million people. About 70 percent of the Basin-wide health risk was attributed to DPM emissions; about 20 percent to other toxics associated with mobile sources (including benzene, butadiene, and formaldehyde); about 10 percent of Basin-wide health risk was attributed to stationary sources (which include industrial sources and other certain specifically identified commercial businesses such as dry cleaners and print shops.)

Multiple Air Toxics Exposure Study III (MATES III): MATES III was part of the SCAQMD Governing Board's 2003-04 Environmental Justice Workplan approved on September 5, 2003. The MATES III report consisted of several elements including a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize carcinogenic health risk across the Basin. Besides toxics, additional measurements included organic carbon, elemental carbon, and total carbon, as well as, Particulate Matter (PM), including PM2.5. It did not estimate mortality or other health effects from particulate exposures. MATES III revealed a general downward trend in air toxic pollutant concentrations with an estimated Basin-wide lifetime carcinogenic health risk of 1,200 in one million. Mobile sources accounted for 94 percent of the basin-wide lifetime carcinogenic health risk with diesel exhaust particulate contributing to 84 percent of the mobile source Basin-wide lifetime carcinogenic health risk. Non-diesel carcinogenic health risk declined by 50 percent from the MATES II values.

Multiple Air Toxics Exposure Study IV (MATES IV): MATES IV, the current version, includes a monitoring program, an updated emissions inventory of toxic air contaminants, and a modeling effort to characterize risk across the Basin. The study focuses on the carcinogenic risk from exposure to air toxics but does not estimate mortality or other health effects from particulate exposures. An additional focus of MATES IV is the inclusion of measurements of ultrafine particle concentrations. MATES IV incorporates the updated health risk assessment methodology from OEHHA. Compared to previous studies of air toxics in the Basin, this study found decreasing air toxics exposure, with the estimated Basin-wide population-weighted risk down by about 57 percent from the analysis done for the MATES III time period. The ambient air toxics data from the ten fixed monitoring locations also demonstrated a similar reduction in air toxic levels and risks. On average, diesel particulate contributes about 68 percent of the total air toxics risk. This is a lower portion of the overall risk compared to the MATES III estimates of about 84 percent.

Health Effects

Carcinogenic Health Risks from TACs: One of the primary health risks of concern due to exposure to TACs is the risk of contracting cancer. The carcinogenic potential of TACs is a particular public health concern because it is currently believed by many scientists that there is no "safe" level of exposure to carcinogens. Any exposure to a carcinogen poses some risk of causing cancer. It is currently estimated that about one in four deaths in the United States is attributable to cancer. The proportion of cancer deaths attributable to air pollution has not been estimated using epidemiological methods.

Non-Cancer Health Risks from TACs: Unlike carcinogens, for most non-carcinogens it is believed that there is a threshold level of exposure to the compound below which it will not pose a health risk. CalEPA's OEHHA develops Reference Exposure Levels (RELs) for TACs which are health-conservative estimates of the levels of exposure at or below which health effects are not expected. The non-cancer health risk due to exposure to a TAC is assessed by comparing the estimated level of exposure to the REL. The comparison is expressed as the ratio of the estimated exposure level to the REL, called the hazard index (HI).

CHAPTER 4

Environmental Impacts

Introduction

Potential Significant Environmental Impacts and Mitigation Measures

Cumulative Environmental Impacts

Potential Environmental Impacts Found Not to be Significant

Significant Environmental Effects Which Cannot Be Avoided

Significant Irreversible Environmental Changes

Potential Growth-Inducing Impacts

Relationship Between Short-Term Uses and Long-Term Productivity

INTRODUCTION

The CEQA Guidelines require environmental documents to identify significant environmental effects that may result from a proposed project (CEQA Guidelines § 15126.2(a)). Direct and indirect significant effects of a project on the environment should be identified and described, with consideration given to both short- and long-term impacts. The discussion of environmental impacts may include, but is not limited to: the resources involved; physical changes; alterations of ecological systems; health and safety problems caused by physical changes; and, other aspects of the resource base, including water, scenic quality, and public services. If significant adverse environmental impacts are identified, the CEQA Guidelines require a discussion of measures that could either avoid or substantially reduce any adverse environmental impacts to the greatest extent feasible (CEQA Guidelines § 15126.4).

The categories of environmental impacts to be studied in a CEQA document are established by CEQA [Public Resources Code § 21000 et seq.], and the CEQA Guidelines, as codified in Title 14 California Code of Regulations § 15000 *et seq.* Under the CEQA Guidelines, there are approximately 17 environmental categories in which potential adverse impacts from a project are evaluated. The Initial Study is designed to evaluate the project and identify those environmental categories that may be adversely affected by a project and to be further analyzed in a subsequent CEQA document.

The CEQA Guidelines also indicate that the degree of specificity required in a CEQA document depends on the type of project being proposed (CEQA Guidelines § 15146). The detail of the environmental analysis for certain types of projects cannot be as great as for others. As explained in Chapter 1, the analysis of PAR 1147 indicated that the type of CEQA document appropriate for the proposed project is a SEA. Due to the large number and wide variety of affected sources (e.g., up to 5,650) at 3,900 existing facilities, this SEA analyzes the environmental impacts by equipment category.

POTENTIAL SIGNIFICANT ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Pursuant to CEQA, a NOP/IS, including an environmental checklist, was prepared for this project (see Appendix B). Of the 17 potential environmental impact categories contained in the environmental checklist, only the topic of operational air quality was identified as having potentially significant adverse impacts requiring further review. Following the release of the NOP/IS, further analysis of the proposed project indicated that the preparation of a SEA, in lieu of an EA, would be the appropriate document to analyze the potentially significant operational air quality impacts associated with PAR 1147 because new information of substantial importance, which was not known and could not have been known at the time the December 2008 Final EA and September 2011 Final SEA were certified, became available (CEQA Guidelines § 15162(a)(3)). Further, PAR 1147 is expected to have same significant adverse effects to the topic of operational air quality that were identified in the NOP/IS, but that were not discussed in the previous December 2008 Final EA or September 2011 Final SEA (CEQA Guidelines §

15162(a)(3)(A)). Thus, the topic of operational air quality is further evaluated in this SEA. The environmental impact analysis for this environmental topic area incorporates a "worst-case" approach. This approach entails the premise that whenever the analysis requires that assumptions be made, those assumptions that result in the greatest adverse impacts are typically chosen. This method ensures that all potential effects of the proposed project are documented for the decision-makers and the public. Accordingly, the following analyses use a conservative "worst-case" approach for analyzing the potentially significant adverse operational air quality impacts associated with the implementation of the proposed project.

AIR QUALITY

PAR 1147 will resolve current Rule 1147 NOx emissions compliance issues that have been raised by businesses. Up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NOx limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, initial analysis of PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day starting in 2017. However, while most of the NOx emission reductions foregone will be eventually recaptured because the existing affected units will be regularly replaced and upgraded over time, approximately 0.03 ton per day of NOx emission reductions will be permanently foregone. Nonetheless, the amount of NOx emission reductions foregone is expected to exceed the SCAQMD's significance operational air quality threshold for NOx (e.g., 55 pounds per day); thus, implementation of PAR 1147 would be expected to have significant adverse operational air quality impacts. No other environmental topic area was identified as having potentially significant adverse impacts if PAR 1147 is implemented.

For this reason, the proposed changes contained in PAR 1147 are considered to contain new information of substantial importance, which was not known and could not have been known at the time the previously CEQA documents for Rule 1147 (e.g., the December 2008 Final EA and the September 2011 Final SEA) were certified. Specifically, because the quantity of NOx emission reductions foregone would exceed the SCAQMD's significance operational air quality threshold for NOx (e.g., 55 pounds per day) and that these effects were not discussed in the previously certified CEQA documents, PAR 1147 will create a new significant effects to operational air quality that need to be further evaluated in this SEA per CEQA Guidelines § 15162(a)(3)(A). Thus, only the topic of operational air quality has been analyzed in this SEA.

Significance Criteria

To determine whether air quality impacts from adopting and implementing the proposed project are significant, impacts will be evaluated and compared to the following criteria. If impacts exceed any of the significance thresholds in Table 4-1, they will be considered significant. All feasible mitigation measures will be identified and implemented to reduce significant impacts to the maximum extent feasible. PAR 1147 will be considered to have significant adverse air quality impacts if any one of the thresholds in Table 4-1 are equaled or exceeded.

Table 4-1
SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds [a]		
Pollutant	**Construction [b]**	**Operation [c]**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

Toxic Air Contaminants (TACs), Odor, and GHG Thresholds	
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402
GHG	10,000 MT/yr CO_2eq for industrial facilities

Ambient Air Quality Standards for Criteria Pollutants [d]	
NO_2 1-hour average annual arithmetic mean	SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state) 0.03 ppm (state) and 0.0534 ppm (federal)
PM_{10} 24-hour average annual average	10.4 $\mu g/m^3$ (construction)[e] & 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$
$PM_{2.5}$ 24-hour average	10.4 $\mu g/m^3$ (construction)[e] & 2.5 $\mu g/m^3$ (operation)
SO_2 1-hour average 24-hour average	0.25 ppm (state) & 0.075 ppm (federal – 99th percentile) 0.04 ppm (state)
Sulfate 24-hour average	25 $\mu g/m^3$ (state)
CO 1-hour average 8-hour average	SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 20 ppm (state) and 35 ppm (federal) 9.0 ppm (state/federal)
Lead 30-day Average Rolling 3-month average	1.5 $\mu g/m^3$ (state) 0.15 $\mu g/m^3$ (federal)

[a] Source: SCAQMD CEQA Handbook (SCAQMD, 1993)
[b] Construction thresholds apply to both the South Coast Air Basin and Coachella Valley (Salton Sea and Mojave Desert Air Basins).
[c] For Coachella Valley, the mass daily thresholds for operation are the same as the construction thresholds.
[d] Ambient air quality thresholds for criteria pollutants based on SCAQMD Rule 1303, Table A-2 unless otherwise stated.
[e] Ambient air quality threshold based on SCAQMD Rule 403.

KEY: lbs/day = pounds per day ppm = parts per million $\mu g/m^3$ = microgram per cubic meter ≥ = greater than or equal to
MT/yr CO_2eq = metric tons per year of CO_2 equivalents > = greater than

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In general, the SCAQMD makes significance determinations for construction impacts based on the maximum or peak daily emissions during the construction period, which provides a "worst-case" analysis of the construction emissions. However, as explained previously, no construction activities are associated with implementing PAR 1147, so the construction significance thresholds do not apply to this project. Similarly, significance determinations for operational emissions are based on the maximum or peak daily allowable emissions during the operational phase.

Project-Specific Air Quality Impacts During Operation

PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 BTU/hour) to address technical feasibility of meeting a 30 ppm NOx limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. However, most NOx emission reductions for PAR 1147 will be delayed and will result in NOx emissions foregone of up to 0.9 ton per day starting in 2017 as a result of an increase in the allowable NOx ppm limit, exempt some units, and extending the compliance date. However, while most of the NOx emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time, approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent.

NOx emission reductions foregone from equipment subject to Rule 1147 is estimated using information on typical use provided by operators visited by SCAQMD staff and potential to emit (PTE) for affected units in SCAQMD records. Based on natural gas consumptions, business owners and equipment vendors indicate typical automotive booths and other booth operations at maintenance facilities, businesses that repair non-automotive equipment, and other specialty shops have emissions of less than one third pound (0.3 pound) NOx each day they operate. However, many booths have greater emissions because they are used for manufacturing operations with one or more shifts per day. Up to 200 booths used in manufacturing and other large coating applications may have emissions of a pound per day or more. In addition, while many auto body shops do not paint cars every day during the week, larger operations can operate two shifts per day.

Based on this information, the 3,400 permitted booths and spray stations have emissions of about 0.5 ton NOx per day (= [3,400 units X approximately 0.3 pound NOx/day per all booth types]/[2000 pounds/ton]). About 1,500 other types of combustion equipment including, but not limited to, ovens, dryers, and furnaces have PTE of less than one pound of NOx per day. Because there is a wide distribution of PTE estimated for these other types of equipment, average emissions from each of these units is assumed to be 0.5 pound of NOx per day for a total of 0.4 ton NOx per day (= [1,500 units X 0.5 pound NOx/day]/[2,000 pounds/ton]). An additional 750 units with a PTE of one pound of NOx per day or greater per unit may have actual emissions less than one pound of NOx per day. The estimated emissions from these 750 units is about 0.3 ton NOx per day (= [750 units X 0.8 pound NOx/day]/[2,000 pounds/ton]).

Based on this approach, the approximately 4,900 to 5,650 units that may be affected by PAR 1147 and that have a PTE of less than one pound of NOx per day per unit is estimated to emit about 0.9 to 1.2 tons of NOx per day. The majority of equipment with emissions less than one pound of NOx per day are subject to a 30 ppm NOx emission limit which would reduce emissions by about 71 percent. However, a much smaller number of equipment that would be subject to a 60 ppm NOx limit and the emission reductions would be about 41 percent. Assuming a 66 percent reduction for the combination of equipment emission reductions of 41 percent to 71 percent, for the 4,900 to 5,650 units, the overall NOx emission reductions foregone is expected to range between approximately 0.6 (excluding the 750 other units that may have emissions less than 1 pound per day) to 0.9 ton per day. Table 4-2 contains a summary of the estimated emission~~s~~ reduction foregone for each source category and the overall total. Of the emission reductions foregone as presented in Table 4-2, while most will eventually be recovered over time, a small portion will be permanently foregone. Thus, Table 4-3 presents a summary of the estimated portion of emission reductions for each source category that will be permanently foregone. NOx is the only pollutant that is affected by the PAR 1147 because the focus of Rule 1147 is to reduce NOx emissions. As shown in Table 4-2, the quantity of peak daily operational NOx emission reductions delayed exceeds the SCAQMD's CEQA significance threshold for operation. Thus, PAR 1147 will result in significant adverse operational air quality impacts for NOx.

Table 4-2
Estimated NOx Emission Reductions Foregone

Source Category	**Estimated NOx emissions per unit (lb/day)**	**Estimated number of units**	**Total estimated NOx emissions (ton/day)**	**66% of NOx emission reductions foregone per 60 ppm NOx limit (ton/day)**	**71% of NOx emission reductions foregone per 30 ppm NOx limit (ton/day)**
Booths and spray stations	0.3	3,400	0.5	0.3	0.4
Ovens, dryers, furnaces, etc.) with emissions less than 1 pound per day	0.5	1,500	0.4	0.3	0.3
Other units that may have emissions less than 1 pound per day	0.8	750	0.3	0.2	0.2
TOTAL	N/A	5,650	1.2	**0.8**	**0.9**
SIGNIFICANCE THRESHOLD*	N/A	N/A	N/A	0.0275	0.0275
SIGNIFICANT?	N/A	N/A	N/A	YES	YES

Notes:
N/A: Not Applicable
* The NOx significance threshold for operation is 55 pounds per day which is equivalent to 0.0275 ton per day.

Table 4-3
Estimated Permanent NOx Emission Reductions Foregone

Equipment Category	**Estimated Number of Units Requiring Permits**	**Estimated Number of Additional (New) Units Requiring Permits**	**Estimated NOx Emission Reductions Permanently Foregone as Compared to Baseline (pounds/day)**
Low Temp Afterburners	25	5	12
Units < 325,000 BTU/hour	165	82	49
		TOTAL	**61**

Note: At the time of the release of the Draft SEA, the estimate of 0.9 tons per day of NO_X emission reductions foregone included a portion of emissions attributed to the low temperature afterburners that would be permanently foregone. However, the analysis in the Draft SEA for low temperature afterburners did not specifically identify the quantity of permanent NOx emission reductions foregone that would be attributed to this equipment category (e.g., 12 pounds per day). Therefore, it is added here for clarification purposes. In addition, at the time of the release of the Draft SEA, the project contained a proposal to increase the NOx compliance limit for low temperature ovens and other units with a heat rating less than 325,000 BTU per hour and the NOx emission reductions foregone for these equipment categories were also included in the total estimate of 0.9 tons per day of NO_X emission reductions foregone. However, subsequent to the release of the Draft SEA, the proposed project was modified to instead exempt all units with heat rating of less than 325,000 BTU per hour. This revision resulted in an additional 49 pounds per day of permanent NO_X emission reductions foregone from units with a heat rating less than 325,000 BTU per hour and are considered new impacts since the release of the Draft SEA.

Table 4-~~3~~4
Estimated NOx Emission Reductions Foregone Per Compliance Year

Compliance Year	NOx Emission Reductions Foregone due to PAR 1147 (ton/day)
2017	0.90
2018	0.87
2019	0.84~~0.83~~
2020	0.80~~0.80~~
2021	0.77~~0.77~~
2022	0.74~~0.73~~
2023	0.71~~0.70~~
2024	0.67~~0.67~~
2025	0.64~~0.63~~
2026	0.61~~0.60~~
2027	0.58~~0.57~~
2028	0.55~~0.53~~
2029	0.51~~0.50~~
2030	0.48~~0.47~~
2031	0.45~~0.43~~
2032	0.42~~0.40~~
2033	0.38~~0.37~~
2034	0.35~~0.33~~
2035	0.32~~0.30~~
2036	0.29~~0.27~~
2037	0.26~~0.23~~
2038	0.22~~0.20~~
2039	0.19~~0.17~~
2040	0.16~~0.13~~
2041	0.13~~0.10~~
2042	0.10~~0.07~~
2043	0.06~~0.03~~
2044 and beyond	**0.03~~0~~**

The baseline emissions inventory for PAR 1147 is the inventory that was used for the 2008 rule adoption. By proposing to delay some of the compliance dates and to exempt some units in PAR 1147, there will be adjustments to the annual operational NOx emission reductions during varying compliance years. Table 4-3 presents the estimated amount of NOx emission reductions that will be permanently foregone, which is a subset of the total NOx emission reductions presented in Table 4-2. Table 4-~~3~~ 4 summarizes the estimated amount of potential NOx emission reductions foregone between 2017 and 2044 and beyond, as a result of the delayed compliance dates and the exemption of certain units contained in PAR 1147.

As shown in Table 4-~~3~~4, the air quality analysis for PAR 1147 indicates that NOx emission reductions delayed during operation will continue to exceed the NOx operational significance threshold for each compliance year in 2017 and beyond. Thus, the operational air quality impacts from implementing PAR 1147 are considered to be significant. If significant adverse environmental impacts are identified in a CEQA document, the CEQA document shall describe feasible measures that could minimize the impacts of the proposed project. However, since PAR 1147 contains adjustments to compliance dates for certain types of equipment and alternatives to the project that are either the 'no project' alternative, or different adjustments to the compliance dates than what is proposed in PAR 1147 (see Chapter 5), there are no feasible mitigation measures that would eliminate or reduce the significant adverse operational air quality impacts for NOx emissions to less than significant levels.

It is important to note that because PAR 1147 focuses on reducing NOx emissions, emissions of other criteria pollutants (e.g., CO, VOC, SOx, PM10, and PM2.5) and toxic air contaminants are not expected to change as a result of PAR 1147 compared with the current requirements for the affected sources under Rule 1147. Thus, PAR 1147 will not result in significant adverse operational air quality impacts for CO, VOC, SOx, PM10, PM2.5 and toxic air contaminants.

CUMULATIVE ENVIRONMENTAL IMPACTS

The cumulative secondary impacts associated with the extended compliance dates and equipment replacement schedules and changes in emission limits of NOx as contained in PAR 1147 will have the potential for creating significant adverse operational air quality impacts for NOx that is evaluated in the previous subchapters and presented in Table 4-2, 4-3, and 4-~~3~~ 4 in the Final SEA. Therefore, adopting PAR 1147 will result in a cumulatively considerable net increase of NOx for which the project region is non-attainment of ozone under NAAQS.

POTENTIAL ENVIRONMENTAL IMPACTS FOUND NOT TO BE SIGNIFICANT

A NOP/IS was initially prepared for the proposed project which included an environmental checklist comprised of approximately 17 environmental topic areas that identified the potential significant adverse impacts from implementing PAR 1147. The NOP/IS concluded that only the topic of operational air quality would have potential significant adverse impacts that would require further review and these impacts were evaluated and discussed in the previous section. In addition, where the NOP/IS concluded that the project would have no significant or less than significant direct or indirect adverse effects on the remaining environmental topics areas, the conclusions for these environmental topic areas are consistent with the conclusions reached in the previously certified documents (e.g., the December 2008 Final EA and the September 2011 Final SEA) that aside from the topic of operational air quality, there would be no other significant adverse effects from implementing PAR 1147. The screening analysis in the NOP/IS concluded that the following environmental areas would not be significantly adversely affected by the proposed project:

- aesthetics
- air quality during construction and GHGs during construction and operation
- agriculture and forestry resources

- biological resources
- cultural resources
- energy
- geology and soils
- hazards and hazardous materials
- hydrology and water quality
- land use and planning
- mineral resources
- noise
- population and housing
- public services
- recreation
- solid and hazardous waste
- transportation and traffic

The detailed evaluation of the above environmental topic areas is contained in the NOP/IS and is not repeated here (see Appendix B). It is important to note that the SCAQMD received two comment letters relative to the NOP/IS during the 30-day review and comment period from February 1, 2017, to March 3, 2017. SCAQMD staff evaluated these comments and prepared responses. The comment letters received relative to the NOP/IS and the responses to the comments are included in Appendix E of this SEA. In addition, oral comments were presented at the CEQA scoping meeting held on February 21, 2017. Again, SCAQMD staff evaluated these comments and prepared responses. The comments made at the CEQA scoping meeting and the responses to these comments are included in Appendix D of this SEA. None of the comments changed the conclusion of no significant adverse impacts in the NOP/IS for the above environmental topic areas.

SIGNIFICANT ENVIRONMENTAL EFFECTS WHICH CANNOT BE AVOIDED

CEQA Guidelines § 15126(b) requires an environmental analysis to consider "any significant environmental effects which cannot be avoided if the proposed project is implemented." This Final SEA identified the topics of air quality impact during operation as the environmental topic area potentially adversely affected by the proposed project. The air quality effects from the operation could not be feasibly mitigated and would result in a significant and unavoidable impact with implementation of the proposed project. This conclusion is also consistent with the finding in the NOP/IS.

SIGNIFICANT IRREVERSIBLE ENVIRONMENTAL CHANGES

CEQA Guidelines § 15126(c) requires an environmental analysis to consider "any significant irreversible environmental changes which would be involved if the proposed action should be implemented." This Final SEA identified the topic of air quality during operation as the only environmental area potentially adversely affected by the proposed project. Facility operators that replace existing units with compliance equipment according to the compliance schedule in PAR 1147 are likely to operate these units for the lifetime of the equipment.

The proposed changes to PAR 1147 would delay up to 0.90 ton per day (2,000 lbs/day X 0.9 ton = 1,800 lbs) of NOx emission reductions starting in compliance years 2017. These delayed NOx emission reductions will not increase existing emissions, but prevent emission reductions from occurring in the specified years. However, while most of the 0.90 ton per day of NOx ~~delayed~~ emission reductions will be eventually recaptured starting in compliance years 2018 because the existing units will be regularly replaced and upgraded over time,~~.~~ approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent (see Table 4-3). Thus, despite the delay in implementation of some of the compliance dates, ~~the same amount~~most of the overall NOx emission reductions as estimated in the current rule will be ~~eventually~~ achieved by PAR 1147. Further, even though the projected NOx emission reductions foregone are estimated to be 0.9 ton per day in 2017 and the permanent emission reductions foregone are estimated to be 0.03 ton per day, the 2012 AQMP allocated one ton per day of NOx emissions in the SIP set aside account for every year starting in year 2013 to year 2030 in the event that NOx emission reductions were not achieved via rule adoptions or amendments. This NOx set aside account was re-evaluated and revised in the Final 2016 AQMP based on expected growth and the number of projects expected to take place in near future years to 2.0 tons per day for every year starting in year 2017 to year 2025 and 1.0 ton per day for every year starting in year 2026 to year 2031. As a result, even PAR 1147 would delay NOx emission reductions and exempt some units, implementation of other control measures in the 2016 AQMP will provide human health benefits by reducing population exposures to existing NOx emissions. For these aforementioned reasons, the proposed project would not result in irreversible environmental changes or irretrievable commitment of resources.

POTENTIAL GROWTH-INDUCING IMPACTS

CEQA Guidelines § 15126(d) requires an environmental analysis to consider the "growth-inducing impact of the proposed action." Implementing the proposed project will not, by itself, have any direct or indirect growth-inducing impacts on businesses in the SCAQMD's jurisdiction because it is not expected to foster economic or population growth or the construction of additional housing and primarily affects existing facilities.

RELATIONSHIP BETWEEN SHORT-TERM USES AND LONG-TERM PRODUCTIVITY

CEQA documents are required to explain and make findings about the relationship between short-term uses and long-term productivity (CEQA Guidelines § 15065(a)(2)). An important consideration when analyzing the effects of a proposed project is whether it will result in short-term environmental benefits to the detriment of achieving long-term goals or maximizing productivity of these resources. Implementing the proposed project is not expected to achieve short-term goals at the expense of long-term environmental productivity or goal achievement. The purpose of the proposed project is to provide compliance relief for a limited group of emission sources. Because PAR 1147 will not eliminate all NOx emission reductions originally contemplated by the adoption of Rule 1147 in December 2008, by continuing to achieve some emission reductions of NOx, which is a precursor to the formation of ozone and PM2.5, even if the proposed project is implemented and there will be some temporary NOx emission reductions foregone between compliance years 2017 and 2031, the NOx emission reductions that will continue to be achieved by other aspects of the rule will continue to help attain federal and state air quality standards which are expected to enhance short and long-term environmental productivity in the region. Implementing the proposed project does not narrow the range of beneficial uses of the environment. Of the potential environmental impacts discussed in Chapter 4, only those related to operational air quality are considered potentially significant.

CHAPTER 5

ALTERNATIVES

INTRODUCTION

This Final SEA provides a discussion of alternatives to the proposed project as required by CEQA. Alternatives include measures for attaining objectives of the proposed project and provide a means for evaluating the comparative merits of each alternative. A 'no project' alternative must also be evaluated. The range of alternatives must be sufficient to permit a reasoned choice, but need not include every conceivable project alternative. CEQA Guidelines Section 15126.6(c) specifically notes that the range of alternatives required in a CEQA document is governed by a 'rule of reason' and only necessitates that the CEQA document set forth those alternatives necessary to permit a reasoned choice. The key issue is whether the selection and discussion of alternatives fosters informed decision making and meaningful public participation. A CEQA document need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative. SCAQMD Rule 110 (the rule which implements the SCAQMD's certified regulatory program) does not impose any greater requirements for a discussion of project alternatives in a SEA than is required for an EIR under CEQA.

Four alternatives to the proposed project are summarized in Table 5-1: Alternative A (No Project), Alternative B (More Stringent), Alternative C (Less Stringent), and Alternative D (Least Stringent). Pursuant to the requirements in CEQA Guidelines Section 15126.6(b) to mitigate or avoid the significant effects that a project may have on the environment, a comparison of the potential operational air quality impacts from each of the project alternatives for the individual rule components that comprise the proposed project is provided in Table 5-2. Aside from this environmental topic area, no other significant adverse impacts were identified for the proposed project or any of the project alternatives. The proposed project is considered to provide the best balance between emission reductions and the adverse environmental impacts due to operation activities while meeting the objectives of the project. Therefore, the proposed project is preferred over the project alternatives.

The Governing Board may choose to adopt any portion or all of any alternative presented in the Final SEA with appropriate findings as required by CEQA. The Governing Board is able to adopt any portion or all of any of the alternatives presented because the impacts of each alternative will be fully disclosed to the public and the public will have the opportunity to comment on the alternatives and impacts generated by each alternative. Written suggestions on potential project alternatives received during the comment period for the Draft SEA ~~will be~~were considered when preparing th~~e~~is Final SEA and included in the Appendix F of this Final SEA.

Table 5-1
Summary of the Proposed Project and Alternatives

Category		Proposed Project	Alternative A: No Project	Alternative B: More Stringent	Alternative C: Less Stringent	Alternative D: Least Stringent
Equipment with NOx emissions < 1 lb/day	Require compliance with emission limit at specific age	30 years, (less stringent than current rule)	20 years (same as current rule but more stringent than proposed project)	25 years (less stringent than current rule but more stringent than proposed project)	No age requirement (less stringent than current rule and proposed project)	No age requirement (less stringent than current rule and proposed project)
	Demonstration of compliance with NOx emission limit	Applicable to new, replacement and rebuilt units but not to relocation of units by the same company and owner	Applicable to new, replacement and rebuilt units (current rule)	Applicable to new, replacement and rebuilt units (same as current rule)	Applicable to new, replacement and rebuilt units but not to relocation of units by the same company and owners	Compliance with limit is not required if provided that records demonstrate emissions < 1 lb/day. However, if records do not demonstrate < 1 lb/day NOx or records are not kept, then the owner/operator shall demonstrate compliance with unit specific NOx limit.
	Other requirements or exemptions	~~N/A~~Further relax limits for units < 325,000 BTU/hour by exempting from any limit	N/A	Require compliance with emission (ppm) limits when multiple similar process units at a facility have combined emissions ≥ 1 lb/day NOx (more stringent than proposed project).	Exempt all pressure washers (less stringent than proposed project) and units ≤~~< 800 ºF and~~ 325,000 BTU/hour from any limit.	Exempt all pressure washers (less stringent than proposed project)~~.~~ and units < 325,000 BTU/hour from any limit.

Table 5-2
Comparison of Adverse Environmental Impacts of the Proposed Project and Alternatives

Category	Proposed Project	Alternative A: No Project	Alternative B: More Stringent	Alternative C: Less Stringent	Alternative D: Least Stringent
Air Quality (during operation)	NOx emission reductions foregone up to 0.9 ton per day. ~~The~~ Most emissions~~s~~ reductions will be recovered over time. Permanent NOx emission reductions foregone up to 0.03 ton per day (see Table 4-3).	No new NOx emission reductions foregone.	NOx emission reductions foregone up to 0.9 ton per day. The emissions~~s~~ reductions foregone will be recovered, but over a shorter time frame than the proposed project.	NOx emission reductions foregone up to 0.9 ton per day. The emissions~~s~~ reductions foregone will be recovered, but over a longer time frame than the proposed project.	Permanent NOx emission reductions foregone up to 0.9 ton per day.
Significance of Air Quality Operational Impacts?	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day.	Not significant, however, compliance may be difficult to achieve for categories of equipment where the proposed project changes emission limits.	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (less significant than the proposed project for years 2018 and beyond).	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (more significant than the proposed project for years 2018 and beyond).	Significant because the amount of NOx emission reductions foregone exceeds the NOx significance threshold of 55 pounds per day. (more significant than the proposed project for years 2018 and beyond).

ALTERNATIVES REJECTED AS INFEASIBLE

A CEQA document should identify any alternatives that were considered by the lead agency, but were rejected as infeasible during the scoping process and explain the reasons underlying the lead agency's determination [CEQA Guidelines § 15126.6(c)]. No alternative was specifically rejected as being infeasible.

DESCRIPTION OF ALTERNATIVES

The following proposed alternatives were developed by modifying specific components of the proposed project. The rationale for selecting and modifying specific components of the proposed project to generate feasible alternatives for the analysis is based on CEQA's requirement to present "realistic" alternatives; that is, alternatives that can actually be implemented.

The initial analysis of the proposed project determined that, of the amendments proposed, only the components that pertain to the delayed compliance schedule to meet certain NOx emission limits and the exempted units could have potential adverse significant impacts during operation. As such, the following four alternatives were developed by identifying and modifying major components of the proposed project. The alternatives, summarized in Table 5-1 and described in the following subsections, include the following: Alternative A (No Project), Alternative B (More Stringent), Alternative C (Less Stringent), and Alternative D (Least Stringent). Unless otherwise specifically noted, all other components of the project alternatives are identical to the components of the proposed project. The following subsections provide a brief description of each alternative.

Proposed Project (30 Years Age Requirement, All Units Except the Ones Subject to Emission Limits, Exempt Less Than 325,000 BTU/hour Units):

The proposed project intended to resolve the compliance issues by changing the emission limits, and compliance dates for certain equipment and exempt some units. Spray booths and small fryers, heated process tanks, evaporators, ovens, dryers, furnaces, afterburners and related devices with emissions less than one pound per day are expected to comply with the applicable NOx emission limits when the equipment reaches 30 years of age. Recovery of the NOx emission reductions foregone are expected to occur starting in 2017 as older equipment gets replaced or retrofitted over time. While most of t~~T~~he NOx emission reductions foregone are expected to be recovered each year based on approximately 0.9 ton/day from compliance year 2017 to 2044, ~~.~~ approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent (see Table 4-3).

Alternative A: No Project (Current Rule)

Alternative A, the no project alternative, means that the current version of Rule 1147 that was amended in September 2011 would remain in effect. Under the current version of Rule 1147, spray booths and small fryers, heated process tanks, evaporators, ovens, dryers, furnaces, afterburners and related devices with emissions less than one pound per day would have to comply with the applicable NOx emission limits from 2017 to 2034. Compliance with these NOx limits would result in NOx emission reductions occurring from 2017 through 2034. Under this alternative, however, suppliers cannot provide equipment that meets the applicable NOx emission limits for source small number of equipment and process types, creating potential compliance issues for some affected facilities, and likely resulting in the originally projected NOx emission reductions not being achieved.

Alternative B: More Stringent Alternative (25 Years Age Requirement):

Under Alternative B, the age requirement of 25 years is more stringent than the 30 years in the proposed project, PAR 1147. Spray booths and small fryers, heated process tanks, evaporators, ovens, dryers, furnaces, afterburners and related devices with emissions less than one pound per day would have to comply with emission limit starting in 2017. Recovery of the NOx emission reductions foregone are expected to occur starting in 2017 as older equipment gets replaced or retrofitted over time. The NOx emission reductions foregone are expected to be recovered each year based on approximately 0.9 ton/day from compliance year 2017 to 2039.

Alternative C: Less Stringent Alternative (No Age Requirement, Exempt Pressure Washers ~~And Low Temperature (Less Than And Equal To 800 °F)~~ And Less Than 325,000 BTU/hour Units):

Under Alternative C, there is no age requirement. However, the expected equipment life is 35 years which is less stringent than the 30 years age requirement in the proposed project, PAR 1147. Spray booths and small fryers, heated process tanks, evaporators, ovens, dryers, furnaces, afterburners and related devices with emissions less than one pound per day are expected to comply with applicable NOx emission limits over the time period of 35 years starting in 2017. Recovery of the NOx emission reductions foregone are expected to occur starting in 2017 as older equipment gets replaced or retrofitted over time. ~~The~~ Most NOx emission reductions foregone are expected to be recovered each year based on approximately 0.9 ton/day from compliance year 2017 to 2049.

In addition, the total additional permanent NOx emission reductions foregone is estimated to be ~~27~~ 36 pounds per day from exempting a small number of pressure washers (estimated to be about 10 new units) and plus 49 pounds per day from exempting all units regardless of ~~low~~ temperature ~~(less than and equal to 800 °F) ovens~~ with burners less than ~~or equal to~~ 325,000 BTU/hour (estimated to be ~~less than 50~~ 82 new units) when compared to the proposed project. Table 5-3 summarizes the estimated amount of the permanent NOx emission reductions foregone in Alternative C as compared to the proposed project.

Table 5-3
Estimated Permanent NOx Emission Reductions Foregone in Alternative C
(as Compared to Proposed Project)

Equipment Category	Estimated Number of Units Requiring Permits	Estimated Number of Additional (New) Units Requiring Permit	Estimated NOx Emission Reductions Foregone Compared to Proposed Project (pounds/day)
~~Spray~~ Pressure Washers	35	10	~~8~~36
~~Ovens ≤~~ All Units < 325,000 BTU/hour	~~50~~165	~~25~~82	~~15~~49
~~Other Heated Tanks ≤ 325,000 BTU/hour~~	~~40~~	~~20~~	~~4~~
		Total	**~~27~~85**

Alternative D: Least Stringent Alternative (Up To 0.9 ton/day Emission Reductions Foregone, No Age Requirement, Exempt Pressure Washers And Less Than 325,000 BTU/hour Units):

Under Alternative D, there is no age requirement and no emission limit requirement. Spray booths and small fryers, heated process tanks, evaporators, ovens, dryers, furnaces, afterburners and related devices with emissions less than one pound per day would not have to comply with any of the applicable NOx emission limits. Under Alternative D, the NOx emission reductions foregone are not expected to be recovered unless the affected equipment units are replaced or retrofitted due to a failure to demonstrate that the affected unit can achieve NOx emissions at the level less than one pound per day. All of the 0.9 ton per day of NOx emission reductions foregone will be permanently foregone under Alternative D.

COMPARISON OF ALTERNATIVES

The following sections describe the potentially significant adverse operational air quality impacts that may occur for each project alternative. Potentially significant adverse operational air quality impacts are quantified where sufficient data are available. A comparison of the environmental impacts for each project alternative is provided in Table 5-2. No other environmental topics other than operational air quality were determined to be significantly adversely affected by implementing any project alternative.

CONCLUSION

By not adopting PAR 1147, Alternative A would not delay any of the requirements in the current version of Rule 1147 to comply with the applicable NOx emission limits. Further, implementation of Alternative A will require the same amount of NOx emission reductions to occur as currently required by Rule 1147. However, Alternative A would not achieve the project objectives for the proposed project because some equipment may not be able to comply with the current NOx emission limits by the applicable compliance dates that start in 2017 because compliant equipment is not currently available for certain small low temperature processes. The non-compliant equipment would need to be shut down. Implementing Alternative A means that there will be no delay in obtaining NOx emission reductions and the corresponding health benefits that result from the NOx emission reductions. Thus, Alternative A is the environmentally superior alternative. However, if the "no project" alternative is determined to be the environmentally superior alternative, then the CEQA document shall identify an environmentally superior alternative among the other alternatives (CEQA Guidelines § 15126.6(e)(2)). Lastly, because non-compliant equipment may need to be shut down, Alternative A is determined to be the least toxic alternative.

If Alternative B were implemented, the same NOx emission limits as the proposed project would apply to the affected sources, but a more stringent compliance schedule will be required when compared to the proposed project. Some small units would not be exempted compare to the proposed project. However under Alternative B, some small low temperature equipment may not be able to comply with the NOx emission limits in accordance with the 25 year compliance schedule. If Alternative B is implemented, ~~equivalent~~ the environmental impacts (as NOx emission reductions foregone) and health benefits will be equivalent to ~~as~~ the proposed project ~~beginning~~ in compliance year~~s~~ 2017 but will have less environmental impacts and more health benefits than the proposed project beginning in compliance year 2018 and for any year thereafter.

For these aforementioned reasons, aside from Alternative A, Alternative B is concluded to be the environmentally superior alternative.

If Alternative C is implemented, less NOx emission reductions would be achieved and less health benefits from reducing NOx emissions overall will be reached between compliance years 2018 and any year thereafter. Alternative C extends the delay in NOx emission reductions as compared to the proposed project. For this reason, when compared to the proposed project, Alternative C provides fewer benefits to air quality and public health. Of the significant adverse operational air quality impacts that would be generated under Alternative C, the impacts would be more than the proposed project and more significant beginning in compliance year 2018 and for any year thereafter.

If Alternative D were implemented, less NOx emission reductions would be achieved and less health benefits from reducing NOx emissions overall will be reached beginning in compliance year 2018 and any year thereafter. Under Alternative D, the NOx emission reductions foregone are not expected to be recovered unless the affected equipment units are replaced or retrofitted due to a failure to demonstrate that the affected equipment can achieve NOx emissions at the level less than one pound per day per equipment unit. Thus, under these conditions, the impacts from the Alternative D would be more than the proposed project and more than significant for air quality beginning in compliance year 2018 and for any year thereafter.

Thus, when comparing the environmental effects of the project alternatives with the proposed project and evaluating the effectiveness of achieving the project objectives of the proposed project versus the project alternatives, the proposed project provides the best balance in achieving the project objectives while minimizing the significant adverse environmental impacts to operational air quality.

APPENDIX A

PROPOSED AMENDED RULE 1147

In order to save space and avoid repetition, please refer to the latest version of Proposed Amended Rule 1147 located elsewhere in the Governing Board Package. The version of Proposed Amended Rule 1147 that was circulated with the Draft SEA and released on March 24, 2017 for a 46-day public review and comment period ending on May 9, 2017 was identified as "PAR 1147 March 22, 2017." Original hard copies of the Draft SEA, which include the draft version of the proposed rule listed above, can be obtained through the SCAQMD Public Information Center at the Diamond Bar headquarters or by contacting the SCAQMD's Public Information Center by phone at (909) 396-2688 or by email at PICrequests@aqmd.gov.

APPENDIX B

NOTICE OF PREPARATION/INITINAL STUDY

South Coast
Air Quality Management District
21865 Copley Drive, Diamond Bar, CA 91765-4178
(909) 396-2000 • www.aqmd.gov

SUBJECT: **NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL ASSESSMENT**

PROJECT TITLE: **PROPOSED AMENDED RULE (PAR) 1147 – NO_x REDUCTIONS FROM MISCELLANEOUS SOURCES**

In accordance with the California Environmental Quality Act (CEQA), the South Coast Air Quality Management District (SCAQMD), as the Lead Agency, must address the potential adverse impacts of the proposed project on the environment and as such, has prepared this Notice of Preparation (NOP) of the Draft Environmental Assessment (EA) and Initial Study (IS). The NOP/IS serves two purposes: 1) to solicit information on the scope of the environmental analysis for the proposed project, and 2) to notify public agencies and the public that the SCAQMD will prepare a Draft EA to further assess potential adverse environmental impacts that may result from implementing the proposed project.

This letter, the attached NOP, and IS are not SCAQMD applications or forms requiring a response from you. Their purpose is simply to provide information to allow public agencies and the public the opportunity to obtain, review and comment on the environmental analysis for the above project. If the proposed project has no bearing on you or your organization, no action on your part is necessary. If you wish to receive the IS for the proposed project, the document is available from the SCAQMD's CEQA website at http://www.aqmd.gov/home/library/documents-support-material/lead-agency-scaqmd-projects or by contacting Fabian Wesson, Public Advisor at the SCAQMD's Public Information Center by phone at (909) 396-2688 or by email at PICrequests@aqmd.gov. Comments focusing on your area of expertise, your agency's area of jurisdiction, if applicable, or issues relative to the environmental analysis should be sent to Mr. Sam Wang (c/o Planning - CEQA) at the above address, by fax to (909) 396-3324, or by email to swang1@aqmd.gov. Comments must be received no later than 5:00 p.m. on Friday, March 3, 2017. Please include the name, phone number, and email address of the contact person. Questions regarding the proposed amended rule should be directed to Mr. Wayne Barcikowski at (909) 396-3077 or by email to wbarcikowski@aqmd.gov.

The Public Workshop and CEQA Scoping Meeting for PAR 1147 is scheduled for February 15, 2017. The Public Hearing for PAR 1147 is scheduled for June 2, 2017. (Note: Public Meeting dates are subject to change).

Date: January 31, 2017 **Signature:** Barbara Radlein

Barbara Radlein
Program Supervisor, CEQA
Planning, Rules, and Area Sources

Reference: California Code of Regulations, Title 14, §§ 15082 (a) and 15375

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT
21865 Copley Drive, Diamond Bar, CA 91765-4178

NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL ASSESSMENT

Project Title:
Proposed Amended Rule (PAR) 1147 – NO_x Reductions from Miscellaneous Sources

Project Location:
The proposed project may affect facilities located throughout the South Coast Air Quality Management District's (SCAQMD) jurisdiction, which covers all of Orange County, the urban portions of Los Angeles and San Bernardino counties southwest of the San Bernardino and San Gabriel mountains, and nearly all of Riverside County, with the exception of communities near the state border.

Description of Nature, Purpose, and Beneficiaries of Project:
SCAQMD staff is proposing to amend Rule 1147 – NO_x Reductions from Miscellaneous Sources, in order to resolve Rule 1147 compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would: 1) change the NO_x emission limit for low temperature (<1,200 degrees Fahrenheit, ºF) ovens and other units with a heat input rating of less than 325,000 Btu/hour from 30 parts per million (ppm) to 60 ppm; 2) change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm; 3) change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 35 year lifetime or until the units are replaced, retrofit or relocated; 4) change the compliance date for heated process tanks from a schedule based on a 15 year to 20 year lifetime to when the units are replaced, retrofit or relocated; 5) add a testing exemption for ultra-low NO_x infrared burners; 6) clarify an exemption for food ovens; and 7) clarify an exemption for flare type systems. Some facilities that may be affected by PAR 1147 are identified on lists compiled by the California Department of Toxic Substances Control per California Government Code §65962.5. If implemented, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time.

Lead Agency:	**Division:**
South Coast Air Quality Management District	Planning, Rule Development and Area Sources

Initial Study and all supporting documentation are available at:	**or by calling:**	**or by accessing the SCAQMD's website at:**
SCAQMD Headquarters 21865 Copley Drive Diamond Bar, CA 91765	(909) 396-2649	http://www.aqmd.gov/home/library/documents-support-material/lead-agency-scaqmd-projects

The Public Notice of Preparation is provided to the public through the following:
☑ Los Angeles Times (February 1, 2017)
☑ SCAQMD Mailing List & Interested Parties
☑ SCAQMD Public Information Center
☑ SCAQMD Website

Initial Study 30-day Review Period:
February 1, 2017 – March 3, 2017

Scheduled Public Meeting Date(s) (subject to change):
Public Workshop & CEQA Scoping Meeting: February 15, 2017, 1:30 p.m.; SCAQMD Headquarters - Auditorium
SCAQMD Governing Board Hearing: June 2, 2017, 9:00 a.m.; SCAQMD Headquarters – Auditorium

The proposed project may have areawide significance; therefore, a CEQA scoping meeting is required to be held pursuant to Public Resources Code §21083.9 (a)(2). The CEQA Scoping Meeting will be held in conjunction with the Public Workshop (see Scheduled Public Meeting Date(s) above).

Send CEQA Comments to:	**Phone:**	**Email:**	**Fax:**
Mr. Sam Wang	(909) 396-2649	swang1@aqmd.gov	(909) 396-3324
Direct Questions on PAR 1147:	**Phone:**	**Email:**	**Fax:**
Mr. Wayne Barcikowski	(909) 396-3077	wbarcikowski@aqmd.gov	(909) 396-3324

SOUTH COAST AIR QUALITY MANAGEMENT DISTRICT

Initial Study for Proposed Amended Rule 1147 – NO_x Reductions from Miscellaneous Sources

January 2017

SCAQMD No. 01312017SW
State Clearinghouse No: To Be Determined

Executive Officer
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	Barbara Baird	Chief Deputy Counsel
	William Wong	Principal Deputy District Counsel

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CHAPTER 1

PROJECT DESCRIPTION

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INTRODUCTION

The California Legislature created the South Coast Air Quality Management District (SCAQMD) in 1977[1] as the agency responsible for developing and enforcing air pollution control rules and regulations in the South Coast Air Basin (Basin) and portions of the Salton Sea Air Basin and Mojave Desert Air Basin. In 1977, amendments to the federal Clean Air Act (CAA) included requirements for submitting State Implementation Plans (SIPs) for nonattainment areas that fail to meet all federal ambient air quality standards (CAA § 172) and similar requirements exist in state law (Health and Safety Code § 40462). The federal CAA was amended in 1990 to specify attainment dates and SIP requirements for ozone, carbon monoxide (CO), nitrogen dioxide (NO_2) and particulate matter with an aerodynamic diameter of less than 10 microns (PM_{10}). In 1997, the United States Environmental Protection Agency (U.S. EPA) promulgated ambient air quality standards for particulate matter with an aerodynamic diameter less than 2.5 microns ($PM_{2.5}$). The California Clean Air Act (CCAA), adopted in 1988, requires the SCAQMD to achieve and maintain state ambient air quality standards for ozone, CO, sulfur dioxide (SO_2), and NO_2 by the earliest practicable date (Health & Safety Code § 40910). The CCAA also requires a three-year plan review, and, if necessary, an update to the SIP. The U.S. EPA is required to periodically update the national ambient air quality standards (NAAQS).

By statute, the SCAQMD is required to adopt an air quality management plan (AQMP) demonstrating compliance with all federal and state ambient air quality standards for the areas within SCAQMD jurisdiction[2]. Furthermore, the SCAQMD must adopt rules and regulations that carry out the AQMP[3]. The AQMP is a regional blueprint for how the SCAQMD will achieve air quality standards and healthful air and the Draft Final 2016 AQMP[4] contains multiple goals promoting reductions of criteria air pollutants, greenhouse gases, and toxics.

The Basin, which includes all of Orange County and the non-desert portions of Los Angeles, San Bernardino and Riverside counties, has one of the worst air quality problems in the nation. Though there have been significant improvements in air quality in the Basin over the last two decades, some ambient air quality standards are still exceeded relatively frequently and by a wide margin. The 2012 AQMP, submitted to the California Air Resources Board (CARB) for SIP inclusion in December 2012, concluded that further reductions in $PM_{2.5}$ and oxides of nitrogen (NO_x) emissions would be necessary to attain the air quality standards for 24-hour $PM_{2.5}$ and 8-hour ozone by the dates mandated by federal law. Less emphasis was placed on achieving emission reductions of volatile organic compounds (VOCs) because NO_x emission reductions have a greater co-benefit of also reducing ozone, and $PM_{2.5}$ formation. Ozone, a criteria pollutant that has been shown to adversely affect human health, is formed when VOCs react with NO_x in the atmosphere. NO_x is a precursor to the formation of ozone and $PM_{2.5}$.

1 The Lewis-Presley Air Quality Management Act, 1976 Cal. Stats., ch. 324 (codified at Health and Safety Code §§40400-40540).
2 Health and Safety Code §40460(a).
3 Health and Safety Code §40440(a).
4 SCAQMD, Draft Final 2016 Air Quality Management Plan. http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/draft-final-aqmp/clean/2016finaldraftaqmpdec2016(clean).pdf

SCAQMD adopted Rule 1147 - NO_x Reductions From Miscellaneous Sources, in December 2008, to control NO_x emissions from miscellaneous gas and liquid fuel fired combustion equipment, including, but not limited to: ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, degassing units, incinerators, and soil remediation units. Rule 1147 required new, modified, relocated and in-use combustion equipment to comply with equipment-specific NO_x emission limits. For in-use equipment, compliance dates for emission limits were based on the date of equipment manufacture, and emission limits went into effect for older equipment first. Owners of equipment were provided at least 15 years before existing equipment would need to be modified or replaced in order to meet the emission limits. Rule 1147 also contained test methods and provided alternate compliance options, including a process for certifying NO_x emissions through an approved testing program. Other requirements included equipment maintenance, meters and recordkeeping.

Businesses have expressed concern regarding the cost effectiveness of complying with the rule requirements for small and low emission sources (less than 1 pound per day of NO_x). In addition, a technology assessment conducted by staff for these small sources indicates that emission limits should be changed for certain specific applications based on technical feasibility and burner availability. SCAQMD staff estimates that 4,900 to 5,650 out of 6,400 units and up to 3,900 facilities would benefit from delayed compliance requirements proposed in Proposed Amended Rule (PAR) 1147. As many as 3,400 spray booths used in manufacturing, equipment repair and maintenance, and auto body repair will benefit from the proposed amendments.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

The California Environmental Quality Act (CEQA), Public Resources Code Section 21000 *et seq.*, requires environmental impacts of proposed projects to be evaluated and feasible methods to reduce, avoid or eliminate significant adverse impacts of these projects to be identified and implemented. The lead agency is the "public agency that has the principal responsibility for carrying out or approving a project that may have a significant effect upon the environment" (Public Resources Code § 21067). Since the SCAQMD has the primary responsibility for supervising or approving the entire project as a whole, which is a proposed SCAQMD rule, it is the most appropriate public agency to act as lead agency (CEQA Guidelines[5] § 15051(b)).

PAR 1147 is considered a "project" as defined by CEQA. CEQA requires that all potential adverse environmental impacts of proposed projects be evaluated and that methods to reduce or avoid identified significant adverse environmental impacts of these projects be implemented if feasible. The purpose of the CEQA process is to inform the SCAQMD Governing Board, public agencies, and interested parties of potential adverse environmental impacts that could result from implementing the proposed project and to identify feasible mitigation measures or alternatives, when an impact is significant.

Public Resources Code Section 21080.5 allows public agencies with regulatory programs to prepare a plan or other written documents in lieu of an environmental impact report once the

[5] The CEQA Guidelines are codified at Title 14 California Code of Regulations § 15000 *et seq.*

secretary of the resources agency has certified the regulatory program. The SCAQMD's regulatory program was certified by the secretary of resources agency on March 1, 1989, and has been adopted as SCAQMD Rule 110 – Rule Adoption Procedures to Assure Protection and Enhancement of the Environment. Pursuant to Rule 110 (the rule which implements the SCAQMD's certified regulatory program), SCAQMD is preparing a Draft Environmental Assessment (EA) to evaluate potential adverse impacts from the proposed project.

The proposed amendments to Rule 1147 are considered a "project" as defined by CEQA. SCAQMD's review of the proposed project shows that implementation of PAR 1147 may have a significant adverse effect on the environment. Since PAR 1147 may have statewide, regional or areawide significance, a CEQA scoping meeting is required to be held for the proposed project pursuant to Public Resources Code Section 21083.9 (a)(2). Information regarding the CEQA scoping meeting can be found on the NOP.

Because PAR 1147 is expected cause potentially significant adverse impacts, the appropriate type of CEQA document to be prepared for the proposed project will be an Environmental Assessment (EA). The EA is a substitute CEQA document, prepared in lieu of a program environmental impact report (EIR) (CEQA Guidelines §15252), pursuant to the SCAQMD's Certified Regulatory Program (CEQA Guidelines §15251 (l); codified in SCAQMD Rule 110). The EA is also a public disclosure document intended to: 1) provide the lead agency, responsible agencies, decision makers and the general public with information on the environmental impacts of the proposed project; and, 2) be used as a tool by decision makers to facilitate decision making on the proposed project.

The first step of preparing an EA is to prepare a Notice of Preparation (NOP) with an Initial Study (IS) that includes an Environmental Checklist and project description. The Environmental Checklist provides a standard evaluation tool to identify a project's adverse environmental impacts. The NOP/IS is also intended to provide information about the proposed project to other public agencies and interested parties prior to the release of the Draft EA.

Thus, the SCAQMD as Lead Agency has prepared this NOP/IS for the proposed project. The initial evaluation in the NOP/IS identified the topic of air quality as potentially being adversely affected by the proposed project: Written comments received on the scope of the environmental analysis will be considered when preparing the Draft EA. Responses to comments on the NOP/IS will be included in the Draft EA.

PROJECT LOCATION

PAR 1147 would affect up to 3,900 facilities which are located within SCAQMD's jurisdiction. The SCAQMD has jurisdiction over an area of approximately 10,743 square miles, consisting of the four-county South Coast Air Basin (Orange County and the non-desert portions of Los Angeles, Riverside and San Bernardino counties), and the Riverside County portions of the Salton Sea Air Basin (SSAB) and Mojave Desert Air Basin (MDAB). The Basin, which is a subarea of SCAQMD's jurisdiction, is bounded by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto mountains to the north and east. It includes all of Orange County and the non-desert portions of Los Angeles, Riverside, and San Bernardino counties. The Riverside County portion of the SSAB is bounded by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley. A federal nonattainment area (known as the Coachella Valley Planning Area) is a subregion of Riverside County and the SSAB that is bounded by the San Jacinto Mountains to the west and the eastern boundary of the Coachella Valley to the east (see Figure 1-1).

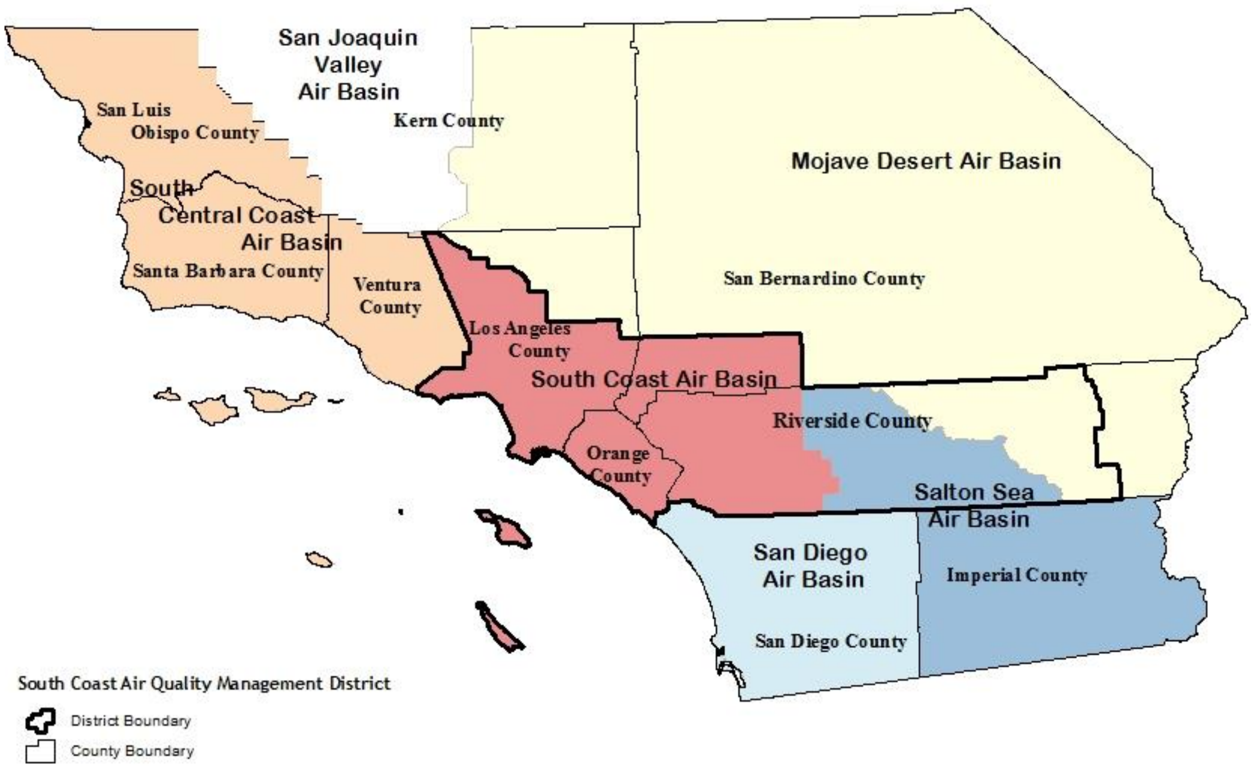

Figure 1-1
Southern California Air Basins

PROJECT BACKGROUND

Rule 1147 – NO_x Reductions from Miscellaneous Sources, was adopted by the SCAQMD Governing Board on December 5, 2008. Rule 1147 established NO_x emission limits for a variety of combustion equipment and affected new and existing combustion equipment requiring permits that are not regulated by other SCAQMD rules limiting emissions of NO_x. Rule 1147 incorporated two control measures of the 2007 AQMP: CMB-01 – NO_x Reductions from Non-RECLAIM Ovens, Dryers and Furnaces, and MCS-01 – Facility Modernization. Control Measure MCS-01 proposed that existing in-use equipment over time meet best available control technology (BACT) emission limits in place at the time the 2007 AQMP was adopted. Control Measure CMB-01 proposed emission NO_x limits in the range of 20 to 60 parts per million (ppm) for ovens, dryers, kilns, furnaces and other combustion equipment.

Under Rule 1147, regulated gaseous fuel-fired equipment must meet an emission limit of 30 or 60 ppm of NO_x based on the type of equipment and process temperature. All regulated liquid fuel-fired equipment must meet an emission limit of 40 or 60 ppm for NO_x based on its process temperature. Compliance dates for emission limits are based on the date of equipment manufacture and emission limits are applicable to older equipment first. Owners of equipment are provided at least 15 years before they must modify or replace existing equipment to meet emission limits.

Rule 1147 also established NO_x emissions test methods and provided alternate compliance options including a process for certification of equipment through an approved testing program. Other requirements included equipment maintenance, time and fuel meter installation and record keeping.

Rule 1147 was amended on September 9, 2011 to: 1) delay implementation dates by up to two years; 2) remove a requirement for fuel or time meters; and 3) provide compliance flexibility for small and large sources. In addition, the amendments included a requirement for a technology assessment to be conducted on the availability of low NO_x burner systems for processes with NO_x emissions of one pound per day or less that are not typically subject to a BACT requirement as new sources. The technology assessment was completed by SCAQMD staff and included an evaluation of cost and cost effectiveness for small and low emission sources. The technology assessment was also reviewed by a third party consultant. Subsequently, PAR 1147 was crafted to be consistent with the recommendations provided by the third party consultant. In addition, PAR 1147 also contains elements to address recommendations proposed by staff (that were separate from the consultant's review) in order to resolve certain stakeholders' compliance issues.

TECHNOLOGY ASSESSMENT

The first phase of the SCAQMD technology assessment targeted sources in which burner technology was either not available or the retrofit cost was comparable to the cost of replacing the unit. Several categories of equipment were identified and removed from Rule 1147. Further, the requirement for a permit for these equipment categories was removed during the May 2013 amendments to SCAQMD Rule 219 – Equipment Not Requiring a Written Permit Pursuant to Regulation II, and Rule 222 – Filing Requirements For Specific Emission Sources Not Requiring a Written Permit Pursuant to Regulation II. SCAQMD staff continued conducting a technical evaluation and developed Rule 1153.1 – Emissions of Oxides of Nitrogen from Commercial Food Ovens, to move existing in-use food ovens, roasters and smokehouses from Rule 1147 into their own rule. Rule 1153.1 was adopted on November 7, 2014 and provided more appropriate temperature ranges for defining emission limits, food oven specific emission limits, later compliance dates and an exemption for small units. Both Rule 1147 and R 1153.1 have been approved by EPA and are included in the SIP.

The last phase of the technology assessment focused on the remaining categories of small and low emission equipment that were not addressed in SCAQMD Rules 219, 222 and 1153.1. While the technology assessment report focused on equipment with NO_x emissions of one pound per day or less, the report also included information and analysis applicable to larger units in response to businesses' concerns regarding the availability of technology for larger equipment.

The technology assessment utilizes information on affected equipment from the SCAQMD's permitting system, SCAQMD Regulation XIII - New Source Review, Rule 1147 emissions testing programs, manufacturers of equipment and burners, affected businesses, consulting engineers, and industry representatives. The technology assessment provides information on the types and number of equipment affected by Rule 1147, emissions characteristics of the affected equipment, and estimates of the cost and cost-effectiveness of replacing existing older combustion systems. Overall, the technology assessment provides insight into compliance and affordability challenges faced by businesses affected by Rule 1147.

With the exception of a few categories of equipment, the technology review demonstrates that low NO_x burner systems are available for every category of equipment subject to Rule 1147 and have been since the late 1990's. However, SCAQMD staff has identified the following three types of equipment for which burners are not readily available or cannot be retrofitted: 1) low temperature ovens and dryers with heat inputs of less than 325,000 Btu per hour (0.325 mmBtu/hour); 2) existing heated process tanks, evaporators and parts washers; and 3) low temperature burn-off ovens and incinerators.

As a result of the technology assessment, the following five recommendations were proposed for consideration in future rule amendments to Rule 1147:

1. Exempt sources with total rated heat input less than 325,000 Btu per hour from the Rule 1147 NO_x emission limit;
2. Change the NO_x emission limit from 30 ppm to 60 ppm NO_x for the primary chamber of all multi-chamber burn-off ovens, burn-out furnaces and incinerators for all process temperature;
3. Delay compliance for existing in-use heated process tanks, evaporators and parts washers from the NO_x emission limit until such time the combustion system or tank is modified, replaced or relocated;
4. Delay compliance with the NO_x emission limit for existing in-use spray booths until the heating system is modified or replaced or the unit is relocated; and
5. Delay compliance with the NO_x emission limit for existing in-use units with actual NOx emissions of one pound per day or less until the combustion system is modified or replaced or the unit is relocated.

PROJECT DESCRIPTION

SCAQMD staff is proposing to amend Rule 1147 to reflect the recommendations made in the technology assessment and to resolve compliance issues that have been raised by stakeholders. If adopted, PAR 1147 would:

- change the NO_x emission limit for low temperature (<1,200 ºF) ovens and other units with a heat input rating of less than 325,000 Btu/hour from 30 parts per million (ppm) to 60 ppm;
- change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm;

- change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 35 year lifetime or until the units are replaced, retrofit or relocated;
- change the compliance date for heated process tanks from a schedule based on a 15 year to 20 year lifetime to when the units are replaced, retrofit or relocated;
- add a testing exemption for ultra-low NO_x infrared burners;
- clarify an exemption for food ovens; and
- clarify an exemption for flare type systems.

If implemented, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. A copy of PAR 1147 can be found in Appendix A of this NOP/IS.

ALTERNATIVES

The Draft EA will discuss and compare a reasonable range of alternatives to the proposed project as required by CEQA Guidelines Section 15126.6 and by SCAQMD Rule 110 where there are potential significant adverse environmental impacts. Alternatives must include realistic measures for attaining the basic objectives of the proposed project and provide a means for evaluating the comparative merits of each alternative. In addition, the range of alternatives must be sufficient to permit a reasoned choice and it need not include every conceivable project alternative. The key issue is whether the selection and discussion of alternatives fosters informed decision making and public participation. A CEQA document need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative.

SCAQMD Rule 110 does not impose any greater requirements for a discussion of project alternatives in an EA than what would be required for an Environmental Impact Report under CEQA. Alternatives will be developed based in part on the major components of the proposed amended rule. The rationale for selecting alternatives rests on CEQA's requirement to present "realistic" alternatives; that is alternatives that can actually be implemented. CEQA also requires an evaluation of a "No Project Alternative."

SCAQMD's policy document Environmental Justice Program Enhancements for fiscal year (FY) 2002-03, Enhancement II-1 recommends that all SCAQMD CEQA assessments include a feasible project alternative with the lowest air toxics emissions. In other words, for any major equipment or process type under the scope of the proposed project that creates a significant environmental impact, at least one alternative, where feasible, shall be considered from a "least harmful" perspective with regard to hazardous air emissions.

The Governing Board may choose to adopt any portion or all of any alternative presented in the EA with appropriate findings as required by CEQA. The Governing Board is able to adopt any portion or all of any of the alternatives presented because the impacts of each alternative will be fully disclosed to the public and the public will have the opportunity to comment on the alternatives and impacts generated by each alternative. Written suggestions on potential project alternatives received during the comment period for the IS will be considered when preparing the Draft EA.

CHAPTER 2

ENVIRONMENTAL CHECKLIST

INTRODUCTION

The environmental checklist provides a standard evaluation tool to identify a project's potential adverse environmental impacts. This checklist identifies and evaluates potential adverse environmental impacts that may be created by PAR 1147.

GENERAL INFORMATION

Project Title:	Proposed Amended Rule (PAR) 1147 – NO_x Reductions from Miscellaneous Sources
Lead Agency Name:	South Coast Air Quality Management District
Lead Agency Address:	21865 Copley Drive Diamond Bar, CA 91765
CEQA Contact Person:	Mr. Sam Wang (909) 396-2649
PAR 1147 Contact Person	Mr. Wayne Barcikowski (909) 396-3077
Project Sponsor's Name:	South Coast Air Quality Management District
Project Sponsor's Address:	21865 Copley Drive Diamond Bar, CA 91765
General Plan Designation:	Not applicable
Zoning:	Not applicable
Description of Project:	PAR 1147 would: 1) change the NO_x emission limit for low temperature (<1,200 degrees Fahrenheit, ºF) ovens and other units with a heat input rating of less than 325,000 Btu/hour from 30 parts per million (ppm) to 60 ppm; 2) change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm; 3) change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 35 year lifetime or until the units are replaced, retrofit or relocated; 4) change the compliance date for heated process tanks from a schedule based on a 15 year to 20 year lifetime to when the units are replaced, retrofit or relocated; 5) add a testing exemption for ultra-low NO_x infrared burners; 6) clarify an exemption for food ovens; and 7) clarify an exemption for flare type systems.
Surrounding Land Uses and Setting:	Not applicable
Other Public Agencies Whose Approval is Required:	Not applicable

ENVIRONMENTAL FACTORS POTENTIALLY AFFECTED

The following environmental impact areas have been assessed to determine their potential to be affected by PAR 1147. As indicated by the checklist on the following pages, environmental topics marked with an "✓" involve at least one impact that is a "Potentially Significant Impact". An explanation relative to the determination of impacts can be found following the checklist for each area.

☐	Aesthetics	☐	Geology and Soils	☐	Population and Housing
☐	Agriculture and Forestry Resources	☐	Hazards and Hazardous Materials	☐	Public Services
☑	Air Quality and Greenhouse Gas Emissions	☐	Hydrology and Water Quality	☐	Recreation
☐	Biological Resources	☐	Land Use and Planning	☐	Solid and Hazardous Waste
☐	Cultural Resources	☐	Mineral Resources	☐	Transportation and Traffic
☐	Energy	☐	Noise	☑	Mandatory Findings of Significance

DETERMINATION

On the basis of this initial evaluation:

☐ I find PAR 1147, in accordance with those findings made pursuant to CEQA Guideline §15252, COULD NOT have a significant effect on the environment, and that an ENVIRONMENTAL ASSESSMENT with no significant impacts has been prepared.

☐ I find that although PAR 1147 could have a significant effect on the environment, there will NOT be significant effects in this case because revisions in the project have been made by or agreed to by the project proponent. An ENVIRONMENTAL ASSESSMENT with no significant impacts will be prepared.

☑ I find that PAR 1147 MAY have a significant effect(s) on the environment, and an ENVIRONMENTAL ASSESSMENT will be prepared.

☐ I find that PAR 1147 MAY have a "potentially significant impact" on the environment, but at least one effect 1) has been adequately analyzed in an earlier document pursuant to applicable legal standards, and 2) has been addressed by mitigation measures based on the earlier analysis as described on attached sheets. An ENVIRONMENTAL ASSESSMENT is required, but it must analyze only the effects that remain to be addressed.

☐ I find that although PAR 1147 could have a significant effect on the environment, because all potentially significant effects (a) have been analyzed adequately in an earlier ENVIRONMENTAL ASSESSMENT pursuant to applicable standards, and (b) have been avoided or mitigated pursuant to that earlier ENVIRONMENTAL ASSESSMENT, including revisions or mitigation measures that are imposed upon PAR 1147, nothing further is required.

Date: January 31, 2017

Signature: ____________________

Barbara Radlein
Program Supervisor, CEQA
Planning, Rules, and Area Sources

ENVIRONMENTAL CHECKLIST AND DISCUSSION

As discussed in Chapter 1, the main focus of PAR 1147 is to resolve Rule 1147 compliance issues that have been raised by businesses. SCAQMD staff estimates 4,900 to 5,650 out of 6,400 units or up to 3,900 facilities would benefit from delayed compliance requirements in PAR 1147. In particular, as many as 3,400 spray booths used in manufacturing, equipment repair and maintenance, and auto body repair will benefit from the proposed amendments.

If adopted, PAR 1147 would: 1) change the NO_x emission limit for low temperature (<1,200 ºF) ovens and other units with a heat input rating of less than 325,000 Btu/hour from 30 ppm to 60 ppm; 2) change the NO_x emission limit for low temperature afterburners, burn-off ovens, incinerators, and related equipment from 30 ppm to 60 ppm; 3) change the compliance date for small in-use units (with NO_x emissions of one pound per day or less) from a schedule based on a 20 year lifetime to a 35 year lifetime or until the units are replaced, retrofit or relocated; 4) change the compliance date for heated process tanks from a schedule based on a 15 year to 20 year lifetime to when the units are replaced, retrofit or relocated; 5) add a testing exemption for ultra-low NO_x infrared burners; 6) clarify an exemption for food ovens; and 7) clarify an exemption for flare type systems. If implemented, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day in 2017 a result of an increase in the allowable NO_x ppm limit and extending the compliance dates. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time.

The effects of implementing the proposed changes outlined above have been evaluated relative to the environmental topics identified in the following environmental checklist (e.g., aesthetics, agricultural and forestry resources, biological resources, etc.). PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime and change the emission limits, which would result in NO_x emission reductions foregone. Therefore, PAR 1147 would be expected to cause secondary adverse environmental effects only for the topic of air quality and greenhouse gas emissions. While there are other procedural changes proposed to PAR 1147 for clarity and consistency throughout the rule, these procedural changes are administrative in natures and are not expected to have a direct or indirect effect on emissions or cause other physical effects to other environmental topic areas and thus, will not be addressed in further in this Initial Study. Therefore, the effects of implementing the aforementioned changes to the emission standards, compliance dates, and equipment replacement schedule etc. will be the main focus of the analysis in this IS.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
I.	**AESTHETICS.** Would the project:				
a)	Have a substantial adverse effect on a scenic vista?	☐	☐	☐	☑
b)	Substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?	☐	☐	☐	☑
c)	Substantially degrade the existing visual character or quality of the site and its surroundings?	☐	☐	☐	☑
d)	Create a new source of substantial light or glare which would adversely affect day or nighttime views in the area?	☐	☐	☐	☑

Significance Criteria

PAR 1147 impacts on aesthetics will be considered significant if:

- The project will block views from a scenic highway or corridor.
- The project will adversely affect the visual continuity of the surrounding area.
- The impacts on light and glare will be considered significant if the project adds lighting which would add glare to residential areas or sensitive receptors.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

I. a), b), c) & d) No Impact. As discussed above, PAR 1147 is expected to affect existing facilities at their current locations. Therefore, adoption of PAR 1147 would not require the construction of new buildings or other structures that would obstruct scenic resources or degrade the existing visual character of a site, including but not limited to, trees, rock outcroppings, or historic buildings. Further, PAR 1147 would not involve the demolition of any existing buildings or facilities, require any subsurface activities, require the acquisition of any new land or the surrendering of existing land, or the modification of any existing land use designations or zoning ordinances. Thus, PAR 1147 is not expected to degrade the visual character of any site where a facility is located or its surroundings, affect any scenic vista or damage scenic resources. Since PAR 1147 does not require existing facilities to operate at night, it is not expected to create any new source of substantial light or glare.

Conclusion

Based upon these considerations, significant adverse aesthetics impacts are not expected from implementing PAR 1147. Since no significant aesthetics impacts were identified, no mitigation measures are necessary or required.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
II.	**AGRICULTURE AND FORESTRY RESOURCES.** Would the project:				
a)	Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland mapping and Monitoring Program of the California Resources Agency, to non- agricultural use?	☐	☐	☐	☑
b)	Conflict with existing zoning for agricultural use, or a Williamson Act contract?	☐	☐	☐	☑
c)	Conflict with existing zoning for, or cause rezoning of, forest land (as defined in Public Resources Code §12220(g)), timberland (as defined by Public Resources Code §4526), or timberland zoned Timberland Production (as defined by Government Code §51104 (g))?	☐	☐	☐	☑
d)	Result in the loss of forest land or conversion of forest land to non-forest use?	☐	☐	☐	☑

Significance Criteria

Project-related impacts on agriculture and forestry resources will be considered significant if any of the following conditions are met:

Project-related impacts on agriculture and forest resources will be considered significant if any of the following conditions are met:

- The proposed project conflicts with existing zoning or agricultural use or Williamson Act contracts.
- The proposed project will convert prime farmland, unique farmland or farmland of statewide importance as shown on the maps prepared pursuant to the farmland mapping and monitoring program of the California Resources Agency, to non-agricultural use.
- The proposed project conflicts with existing zoning for, or causes rezoning of, forest land (as defined in Public Resources Code §12220 (g)), timberland (as defined in Public Resources Code §4526), or timberland zoned Timberland Production (as defined by Government Code § 51104 (g)).

- The proposed project would involve changes in the existing environment, which due to their location or nature, could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

II. a), b), c) & d) No Impact. The existing industrial or commercial businesses that may be affected by the adoption of PAR 1147 are primarily located within urbanized areas that are typically designated as industrial or commercial areas. PAR 1147 would not result in or require the relocation of existing facilities or any new construction of buildings or other structures that would convert farmland to non-agricultural use or conflict with zoning for agricultural use or a Williamson Act contract. PAR 1147 would not require conversion of farmland to non-agricultural uses because the affected equipment is expected to be located completely within the confines of existing affected commercial and industrial facilities. For the same reasons, PAR 1147 would not result in the loss of forest land or conversion of forest land to non-forest use.

Conclusion

Based upon these considerations, significant adverse agricultural and forest resources impacts are not expected from implementing PAR 1147. Since no significant agricultural and forest resources impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
III. AIR QUALITY AND GREENHOUSE GAS EMISSIONS. Would the project:				
a) Conflict with or obstruct implementation of the applicable air quality plan?	☐	☐	☑	☐
b) Violate any air quality standard or contribute to an existing or projected air quality violation?	☑	☐	☐	☐
c) Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions that exceed quantitative thresholds for ozone precursors)?	☑	☐	☐	☐
d) Expose sensitive receptors to substantial pollutant concentrations?	☐	☐	☐	☑
e) Create objectionable odors affecting a substantial number of people?	☐	☐	☐	☑
f) Diminish an existing air quality rule or future compliance requirement resulting in a significant increase in air pollutant(s)?	☑	☐	☐	☐
g) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?	☐	☐	☐	☑
h) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?	☐	☐	☐	☑

Air Quality Significance Criteria

To determine whether or not air quality impacts from adopting and implementing PAR 1147 are significant, impacts will be evaluated and compared to the criteria in Table 2-1. PAR 1147 will be considered to have significant adverse air quality impacts if any one of the thresholds in Table 2-1 are equaled or exceeded.

Table 2-1
SCAQMD Air Quality Significance Thresholds

Mass Daily Thresholds [a]		
Pollutant	**Construction [b]**	**Operation [c]**
NO_x	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM_{10}	150 lbs/day	150 lbs/day
$PM_{2.5}$	55 lbs/day	55 lbs/day
SO_x	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day

Toxic Air Contaminants (TACs), Odor, and GHG Thresholds	
TACs (including carcinogens and non-carcinogens)	Maximum Incremental Cancer Risk ≥ 10 in 1 million Cancer Burden > 0.5 excess cancer cases (in areas ≥ 1 in 1 million) Chronic & Acute Hazard Index ≥ 1.0 (project increment)
Odor	Project creates an odor nuisance pursuant to SCAQMD Rule 402
GHG	10,000 MT/yr CO_2eq for industrial facilities

Ambient Air Quality Standards for Criteria Pollutants [d]	
NO_2 1-hour average annual arithmetic mean	SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 0.18 ppm (state) 0.03 ppm (state) and 0.0534 ppm (federal)
PM_{10} 24-hour average annual average	 10.4 $\mu g/m^3$ (construction)[e] & 2.5 $\mu g/m^3$ (operation) 1.0 $\mu g/m^3$
$PM_{2.5}$ 24-hour average	 10.4 $\mu g/m^3$ (construction)[e] & 2.5 $\mu g/m^3$ (operation)
SO_2 1-hour average 24-hour average	 0.25 ppm (state) & 0.075 ppm (federal – 99th percentile) 0.04 ppm (state)
Sulfate 24-hour average	 25 $\mu g/m^3$ (state)
CO 1-hour average 8-hour average	SCAQMD is in attainment; project is significant if it causes or contributes to an exceedance of the following attainment standards: 20 ppm (state) and 35 ppm (federal) 9.0 ppm (state/federal)
Lead 30-day Average Rolling 3-month average	 1.5 $\mu g/m^3$ (state) 0.15 $\mu g/m^3$ (federal)

[a] Source: SCAQMD CEQA Handbook (SCAQMD, 1993)
[b] Construction thresholds apply to both the South Coast Air Basin and Coachella Valley (Salton Sea and Mojave Desert Air Basins).
[c] For Coachella Valley, the mass daily thresholds for operation are the same as the construction thresholds.
[d] Ambient air quality thresholds for criteria pollutants based on SCAQMD Rule 1303, Table A-2 unless otherwise stated.
[e] Ambient air quality threshold based on SCAQMD Rule 403.

KEY: lbs/day = pounds per day; ppm = parts per million; $\mu g/m^3$ = microgram per cubic meter; ≥ = greater than or equal to; MT/yr CO_2eq = metric tons per year of CO_2 equivalents; > = greater than

Revision: March 2015

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

III. a) Less than Significant Impact. The equipment affected by PAR 1147 are regulated under current SCAQMD Rule 1147. Development of Rule 1147 was based on two control measures from the SCAQMD 2007 AQMP: Control Measure MCS-01 – Facility Modernization and Control Measure CMB-01 – NO_x Reductions from Non-RECLAIM Ovens, Dryers, and Furnaces.

Control Measure MCS-01 was a new control measure developed for the 2007 AQMP that proposed companies upgrade their current technology to BACT – the cleanest technology available. The facility modernization control measure proposed that equipment operators meet BACT emission limits at the end of the equipment's useful life. For equipment currently regulated by Rule 1147, modernization requires burner upgrades, replacement of burner systems or replacement of equipment when the equipment reaches 15 to 20 years of age. However, PAR 1147 would implement higher NO_x emission limits for applicable units (e.g., low temperature afterburners, burn-off ovens and incinerators) and provide an exemption for several categories of units (e.g., in-use heated process tanks, spray booths and food ovens) in order to resolve Rule 1147 businesses compliance issues. NO_x emission reductions will be delayed by PAR 1147 and will result in NO_x emissions foregone of up to 0.9 tons per day starting in 2017 as a result of an increase in the allowable NO_x ppm limit and changing the compliance date. This is considered a significant air quality impact and will be further evaluated in the Draft EA. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time.

Even with emission reductions foregone, implementing PAR 1147 is not expected to significantly conflict with or obstruct implementation of the applicable air quality control plan because the 2012 AQMP demonstrated that the effects of all existing rules, in combination with implementing all AQMP control measures (including "black box" measures not specifically described in the 2012 AQMP) would bring the District into attainment with all applicable national and state ambient air quality standards. In addition, the most recent regional blueprint for how the SCAQMD will achieve air quality standards and healthful air is outlined in the 2016 AQMP[1], which contains multiple goals promoting reductions of criteria air pollutants (especially NOx and PM emissions), greenhouse gases, and toxics. The 2016 AQMP also includes a set aside account of 3 tons per day of SIP reserve to account for any potential backsliding in forecasted rule emission reductions. Any backsliding that may occur will be reflected in future inventories and will be used for future

[1] SCAQMD, Draft Final 2016 Air Quality Management Plan, http://www.aqmd.gov/docs/default-source/clean-air-plans/air-quality-management-plans/2016-air-quality-management-plan/draft-final-aqmp/clean/2016finaldraftaqmpdec2016(clean).pdf.

attainment demonstrations, at which time an appropriate control strategy would need to be developed to account for changes in inventory, future emissions, and attainment demonstrations. At the time of this publication, the 2016 AQMP is scheduled for consideration by the SCAQMD Governing Board on February 3, 2017.

Thus, while PAR 1147 will allow a higher NO_x limit than under current Rule 1147, the foregone emission reductions are expected to be achieved through other control measures in the 2016 AQMP and if needed, to be offset by the 3 tons per day of SIP reserve.

For these reasons, PAR 1147 would not obstruct or conflict with the implementation of the previous 2012 AQMP or the 2016 AQMP. Additionally, PAR 1147 does not include any provisions which would conflict with the attainment of ozone and PM standards in either the 2012 AQMP or the 2016 AQMP. Therefore, PAR 1147 is not expected to conflict or obstruct implementation of the applicable air quality plan.

III. b) Potentially Significant Impact.

Facility Applicability

The main objective of PAR 1147 is to provide relief for Rule 1147 businesses who are encountering compliance issues and are unable to meet the NO_x requirements currently established in Rule 1147. SCAQMD staff estimates 4,900 to 5,650 out of 6,400 units and up to 3,900 facilities would benefit from delayed compliance requirements proposed by the amendments considered for Rule 1147. As many as 3,400 spray booths used in manufacturing, equipment repair and maintenance, and auto body repair will benefit from the proposed amendments.

Construction Impacts

As discussed above, PAR 1147 is expected to affect the existing facilities at current locations. Any potential equipment replacement (e.g. at the end of its useful life) would require minimum construction that was already included in baseline of implementing Rule 1147, as burners are pre-manufactured items that typically drop into place. Therefore, adoption of PAR 1147 would not require the construction of new buildings or other structures that would generate construction emissions. Although there could be a delivery truck if a facility chooses to install a new burner or replace a piece of equipment, the related emissions are already included in the baseline. Because no additional vehicle trips would be generated by PAR 1147, there would be no increase of emissions and no adverse impacts are anticipated.

As a result, according to the above analysis of potential construction impacts, there would be no significant adverse construction air quality impacts resulting from PAR 1147 for criteria pollutants. Therefore, air quality impacts from construction are less than significant and will not be further analyzed in the Draft EA.

Operational Impacts- Criteria Pollutants

PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. However, NO_x emission reductions for PAR 1147 will be delayed and will result in NO_x emissions foregone of up to 0.9 tons per day starting in 2017 as a result of an increase in the allowable NO_x ppm limit and extending the compliance date. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. Detailed analysis of the NO_x emissions foregone as a result of PAR 1147 will be included in the Draft EA.

Because PAR 1147 focuses on NO_x emissions, emissions of CO, VOC and PM are not expected to change as a result of PAR 1147 compared with the current requirements for the affected sources under Rule 1147.

Operational Impacts- Toxic Air Contaminants

In assessing potential impacts from the adoption of PAR 1147, SCAQMD staff not only evaluates the potential air quality benefits, but also determines potential health risks associated with implementation of PAR 1147.

PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and no changes in toxic operational emissions from the existing affected facilities are expected from implementing PAR 1147 when compared to current Rule 1147. As a result, there will be no increase in toxic air contaminant emissions from the affected facilities due to PAR 1147.

III. c) Potentially Significant Impact. The cumulative secondary impacts associated with the delayed compliance dates, changes in emission limits, and extended equipment replacement schedules as contained in PAR 1147 will have the potential for creating significant adverse air quality impacts that will be evaluated in the Draft EA.

III. d) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and there would be no change in operational emissions from the existing affected facilities and receptors would not be exposed to increased amounts of pollutants.

III. e) No Impact. Odor problems depend on individual circumstances, materials involved, and individual odor sensitivities. For example, individuals can differ quite markedly from the population average in their sensitivity to odor due to any variety of innate, chronic or acute physiological conditions. This includes olfactory adaptation or smell fatigue (i.e., continuing exposure to an odor usually results in a gradual diminution or even disappearance of the smell sensation).

PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and there would be no change in the existing odor profile of the affected facilities. Further, PAR 1147 would not require construction activities that would require the use of construction equipment. As a result, no odor impacts associated with diesel exhaust from either on-road or off-road mobile sources are expected to occur. Additionally, no change in operation at the affected facilities is expected to occur as a result of the adoption of PAR 1147. Therefore, PAR 1147 is not expected to create new significant adverse objectionable odors.

III. f) Potentially Significant Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and no change in operational emissions from the existing affected facilities are expected. However, NO_x emission reductions for PAR 1147 are delayed compared with Rule 1147 and will result in NO_x emissions foregone of up to 0.9 tons per day starting in 2017 as a result of an increase in the allowable NO_x ppm limit and changing the compliance date. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. Detailed analysis of the NO_x emissions foregone as a result of PAR 1147 will be included in the Draft EA.

III. g) & h) No Impact. Changes in global climate patterns have been associated with global warming, an average increase in the temperature of the atmosphere near the Earth's surface, recently attributed to accumulation of GHG emissions in the atmosphere. GHGs trap heat in the atmosphere, which in turn heats the surface of the Earth. Some GHGs occur naturally and are emitted to the atmosphere through natural processes, while others are created and emitted solely through human activities. The emission of GHGs through the combustion of fossil fuels (i.e., fuels containing carbon) in conjunction with other human activities, appears to be closely associated with global warming.[2] State law defines GHG to include the following: carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6) (HSC §38505(g)). The most common GHG that results from human activity is CO_2, followed by CH_4 and N_2O.

GHGs and other global warming pollutants are often perceived as solely global in their impacts and that increasing emissions anywhere in the world contributes to climate change anywhere in the world. However, a study conducted on the health impacts of CO_2 "domes" that form over urban areas cause increases in local temperatures and local criteria pollutants, which have adverse health effects[3].

The analysis of GHGs is a much different analysis than the analysis of criteria pollutants for the following reasons. For criteria pollutants, the significance thresholds are based on daily emissions because attainment or non-attainment is primarily based on daily exceedances of applicable ambient air quality standards. Further, several ambient air quality standards are based on relatively short-term exposure effects on human health (e.g., one-hour and eight-hour standards). Since the half-life of CO_2 is approximately 100 years, for example, the effects of GHGs occur over a longer term which means they affect the global climate over a relatively long time frame. As a result, the SCAQMD's current position is to evaluate the effects of GHGs over a longer timeframe than a single day (e.g., annual emissions). GHG emissions are typically considered to be cumulative impacts because they contribute to global climate effects.

On December 5, 2008, the SCAQMD adopted an interim CEQA GHG Significance Threshold for projects where SCAQMD is the lead agency (SCAQMD, 2008). This interim threshold is set at 10,000 metric tons of CO_2 equivalent emissions ($MTCO_2eq$) per year. Projects with incremental increases below this threshold will not be cumulatively considerable.

PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and there would be no change in operational emissions of other criteria pollutants and GHG emissions, from the existing affected facilities and PAR 1147 is not expected to create significant cumulative adverse GHG emission impacts or conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of GHGs.

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2 Solomon, S., D. Qin, M. Manning, Z. Chen, M. Marquis, K.B. Averyt, M. Tignor and H.L. Miller (eds.). 2007. Contribution of Working Group I to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 2007. Cambridge University Press. http://www.ipcc.ch/publications_and_data/ar4/wg1/en/contents.html

3 Jacobsen, Mark Z. "Enhancement of Local Air Pollution by Urban CO_2 Domes," Environmental Science and Technology, as describe in Stanford University press release on March 16, 2010 available at: http://news.stanford.edu/news/2010/march/urban-carbon-domes-031610.html.

Conclusion

As previously discussed, PAR 1147 is expected to result in potentially significant impacts on air quality. Potentially significant adverse air quality impacts from the adoption and implementation of PAR 1147 will be further evaluated in the Draft EA.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
IV. BIOLOGICAL RESOURCES. Would the project:				
a) Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as a candidate, sensitive, or special status species in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☑
b) Have a substantial adverse effect on any riparian habitat or other sensitive natural community identified in local or regional plans, policies, or regulations, or by the California Department of Fish and Game or U.S. Fish and Wildlife Service?	☐	☐	☐	☑
c) Have a substantial adverse effect on federally protected wetlands as defined by §404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means?	☐	☐	☐	☑
d) Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites?	☐	☐	☐	☑
e) Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance?	☐	☐	☐	☑
f) Conflict with the provisions of an adopted Habitat Conservation plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan?	☐	☐	☐	☑

Significance Criteria
Impacts on biological resources will be considered significant if any of the following criteria apply:

- The project results in a loss of plant communities or animal habitat considered to be rare, threatened or endangered by federal, state or local agencies.
- The project interferes substantially with the movement of any resident or migratory wildlife species.
- The project adversely affects aquatic communities through construction or operation of the project.

Discussion
PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

IV. a), b), c), & d) No Impact. PAR 1147 would not require any relocation of existing facilities, new development, or require major modifications to buildings or other structures to comply with the new requirements for the affected equipment beyond what is currently required in Rule 1147. The equipment affected is expected to be located at existing facilities that are already paved. As a result, PAR 1147 would not directly or indirectly affect any species identified as a candidate, sensitive or special status species, riparian habitat, federally protected wetlands, or migratory corridors. For this same reason, PAR 1147 is not expected to adversely affect special status plants, animals, or natural communities.

IV. e) & f) No Impact. PAR 1147 would not require any relocation of existing facilities, new development, or require major modifications to buildings or other structures to comply with the new requirements for the affected equipment beyond what is currently required in Rule 1147. The equipment affected is expected to be located at existing facilities. Therefore, PAR 1147 would not conflict with local policies or ordinances protecting biological resources or local, regional, or state conservation plans because it would not cause new development. Additionally, PAR 1147 would not conflict with any Habitat Conservation Plan, Natural Community Conservation Plan, or any other relevant habitat conservation plan for the same reason identified in Section IV. a), b), c), and d) above. Likewise, PAR 1147 would not in any way impact wildlife or wildlife habitat.

Conclusion
Based upon these considerations, significant adverse biological resources impacts are not expected from implementing PAR 1147. Since no significant biological resources impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
V. CULTURAL RESOURCES. Would the project:				
a) Cause a substantial adverse change in the significance of a historical resource as defined in §15064.5?	☐	☐	☐	☑
b) Cause a substantial adverse change in the significance of an archaeological resource as defined in §15064.5?	☐	☐	☐	☑
c) Directly or indirectly destroy a unique paleontological resource, site, or feature?	☐	☐	☐	☑
d) Disturb any human remains, including those interred outside formal cemeteries?	☐	☐	☐	☑
e) Cause a substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code §21074?	☐	☐	☐	☑

Significance Criteria

Impacts to cultural resources will be considered significant if:

- The project results in the disturbance of a significant prehistoric or historic archaeological site or a property of historic or cultural significance, or tribal cultural significance to a community or ethnic or social group or a California Native American tribe.
- Unique paleontological resources or objects with cultural value to a California Native American tribe are present that could be disturbed by construction of the proposed project.
- The project would disturb human remains.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

V. a), b), c), & d) No Impact. PAR 1147 does not require construction of new facilities, increasing the floor space of existing facilities, or any other construction activities that would require disturbing soil that may contain cultural resources beyond what is currently required in Rule 1147. The equipment affected is expected to be located at existing facilities that are already paved. Since no construction-related activities requiring soil disturbance would be associated with the implementation of PAR 1147, no adverse impacts to historical or cultural resources are anticipated to occur. Further, PAR 1147 is not expected to require any physical changes to the environment, which may disturb paleontological or archaeological resources or disturb human remains interred outside of formal cemeteries.

V. e) No Impact. PAR 1147 is not expected to require physical changes, feature, place, cultural landscape, sacred place or object with cultural value to a California Native American Tribe. Furthermore, PAR 1147 is not expected to result in a physical change to a resource determined to be eligible for inclusion or listed in the California Register of Historical Resources or included in a local register of historical resources. For these reasons, PAR 1147 is not expected to cause any substantial adverse change in the significance of a tribal cultural resource as defined in Public Resources Code §21074.

As part of releasing this CEQA document for public review and comment, the SCAQMD also provided a formal notice of the proposed project to all California Native American Tribes (Tribes) that requested to be on the Native American Heritage Commission's (NAHC) notification list per Public Resources Code §21080.3.1(b)(1). The NAHC notification list provides a 30-day period during which a Tribe may respond to the formal notice, in writing, requesting consultation on the proposed project.

In the event that a Tribe submits a written request for consultation during this 30-day period, the SCAQMD will initiate a consultation with the Tribe within 30 days of receiving the request in accordance with Public Resources Code §21080.3.1(b). Consultation ends when either: 1) both parties agree to measures to avoid or mitigate a significant effect on a Tribal Cultural Resource and agreed upon mitigation measures shall be recommended for inclusion in the environmental document [see Public Resources Code §21082.3(a)]; or, 2) either party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached [see Public Resources Code §21080.3.2(b)(1)-(2) and §21080.3.1(b)(1)].

Conclusion

Based upon these considerations, significant adverse cultural resources impacts are not expected from implementing PAR 1147. Since no significant cultural resources impacts were identified, no mitigation measures are necessary or required.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
VI.	**ENERGY.** Would the project:				
a)	Conflict with adopted energy conservation plans?	☐	☐	☐	☑
b)	Result in the need for new or substantially altered power or natural gas utility systems?	☐	☐	☐	☑
c)	Create any significant effects on local or regional energy supplies and on requirements for additional energy?	☐	☐	☐	☑
d)	Create any significant effects on peak and base period demands for electricity and other forms of energy?	☐	☐	☐	☑
e)	Comply with existing energy standards?	☐	☐	☐	☑

Significance Criteria

Impacts to energy resources will be considered significant if any of the following criteria are met:

- The project conflicts with adopted energy conservation plans or standards.
- The project results in substantial depletion of existing energy resource supplies.
- An increase in demand for utilities impacts the current capacities of the electric and natural gas utilities.
- The project uses non-renewable resources in a wasteful and/or inefficient manner.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

VI. a) & e) No Impact. As discussed above, PAR 1147 is not expected to create any additional demand for energy at any of the affected facilities beyond what is currently required in Rule 1147. In fact, PAR 1147 relaxes the need for add-on controls which consume energy. Since it is unlikely that the affected facilities would require new equipment or modifications, it is unlikely that energy demand requirements would change. As a result, PAR 1147 would not conflict with energy conservation plans, use non-renewable resources in a wasteful manner, or result in the need for new or substantially altered power or natural gas systems. Since PAR 1147 would affect existing facilities, it will not conflict with adopted energy conservation plans because existing facilities would be expected to continue implementing any existing energy conservation plans. Additionally, operators of affected facilities are expected to implement existing energy conservation plans or comply with energy standards to minimize operating costs.

VI. b), c) & d) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. PAR 1147 is not expected to increase any electricity or natural gas demand in any way and would not create any significant effects on peak and base period demands for electricity and other forms of energy.

Conclusion

Based upon these considerations, significant adverse energy impacts are not expected from implementing PAR 1147. Since no significant energy impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
VII. GEOLOGY AND SOILS. Would the project:				
a) Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:	☐	☐	☐	☑
• Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?	☐	☐	☐	☑
• Strong seismic ground shaking?	☐	☐	☐	☑
• Seismic–related ground failure, including liquefaction?	☐	☐	☐	☑
b) Result in substantial soil erosion or the loss of topsoil?	☐	☐	☐	☑
c) Be located on a geologic unit or soil that is unstable or that would become unstable as a result of the project, and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction or collapse?	☐	☐	☐	☑
d) Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?	☐	☐	☐	☑
e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?	☐	☐	☐	☑

Significance Criteria

Impacts on the geological environment will be considered significant if any of the following criteria apply:

- Topographic alterations would result in significant changes, disruptions, displacement, excavation, compaction or over covering of large amounts of soil.
- Unique geological resources (paleontological resources or unique outcrops) are present that could be disturbed by the construction of the proposed project.

- Exposure of people or structures to major geologic hazards such as earthquake surface rupture, ground shaking, liquefaction or landslides.
- Secondary seismic effects could occur which could damage facility structures, e.g., liquefaction.
- Other geological hazards exist which could adversely affect the facility, e.g., landslides, mudslides.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

VII. a) No Impact. Southern California is an area of known seismic activity. Structures must be designed to comply with the Uniform Building Code Zone 4 requirements if they are located in a seismically active area. The local city or county is responsible for assuring that a proposed project complies with the Uniform Building Code as part of the issuance of the building permits and can conduct inspections to ensure compliance. The Uniform Building Code is considered to be a standard safeguard against major structural failures and loss of life. The goal of the code is to provide structures that will: 1) resist minor earthquakes without damage; 2) resist moderate earthquakes without structural damage but with some non-structural damage; and 3) resist major earthquakes without collapse but with some structural and non-structural damage.

The Uniform Building Code bases seismic design on minimum lateral seismic forces (“ground shaking”). The Uniform Building Code requirements operate on the principle that providing appropriate foundations, among other aspects, helps to protect buildings from failure during earthquakes. The basic formulas used for the Uniform Building Code seismic design require determination of the seismic zone and site coefficient, which represent the foundation conditions at the site. Accordingly, buildings and equipment at existing affected facilities are likely to conform with the Uniform Building Code and all other applicable state codes in effect at the time they were constructed.

As discussed above, no new buildings or structures are expected to be constructed; therefore, PAR 1147 is not expected to affect a facility’s ability to continue to comply with any applicable Uniform Building Code requirements. Consequently, PAR 1147 is not expected to expose persons or property to geological hazards such as earthquakes, landslides, mudslides, ground failure, or other natural hazards. As a result, substantial exposure of people or structure to the risk of loss, injury, or death involving seismic-related activities is not anticipated.

VII. b), c), d) & e) No Impact. Since PAR 1147 would affect existing facilities, it is expected that the soil types present at the affected facilities that are susceptible to expansion or liquefaction would be considered part of the existing setting. New subsidence impacts are not anticipated since no excavation, grading, or fill activities will occur at affected facilities. Further, PAR 1147 does not involve drilling or removal of underground products (e.g., water, crude oil, et cetera) that could produce new, or make worse existing subsidence effects. Additionally, the affected areas are not envisioned to be prone to new risks from landslides or have unique geologic features, since the affected facilities are located in industrial or commercial areas where such features have already been altered or removed. Finally, since adoption of PAR 1147 would be expected to affect operations at existing facilities, PAR 1147 is not expected to alter or make worse any existing potential for subsidence, liquefaction, etc.

Conclusion

Based upon these considerations, significant adverse geology and soil impacts are not expected from implementing PAR 1147. Since no significant geology and soil impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
VIII. HAZARDS AND HAZARDOUS MATERIALS. Would the project:				
a) Create a significant hazard to the public or the environment through the routine transport, use, and disposal of hazardous materials?	☐	☐	☐	☑
b) Create a significant hazard to the public or the environment through reasonably foreseeable upset conditions involving the release of hazardous materials into the environment?	☐	☐	☐	☑
c) Emit hazardous emissions, or handle hazardous or acutely hazardous materials, substances, or waste within one-quarter mile of an existing or proposed school?	☐	☐	☐	☑
d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code §65962.5 and, as a result, would create a significant hazard to the public or the environment?	☐	☐	☐	☑
e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public use airport or a private airstrip, would the project result in a safety hazard for people residing or working in the project area?	☐	☐	☐	☑
f) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?	☐	☐	☐	☑
g) Expose people or structures to a significant risk of loss, injury or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?	☐	☐	☐	☑
h) Significantly increased fire hazard in areas with flammable materials?	☐	☐	☐	☑

Significance Criteria
Impacts associated with hazards will be considered significant if any of the following occur:

- Non-compliance with any applicable design code or regulation.
- Non-conformance to National Fire Protection Association standards.
- Non-conformance to regulations or generally accepted industry practices related to operating policy and procedures concerning the design, construction, security, leak detection, spill containment or fire protection.
- Exposure to hazardous chemicals in concentrations equal to or greater than the Emergency Response Planning Guideline (ERPG) 2 levels.

Discussion
PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

VIII. a, b) & c) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. Since PAR 1147 does not require the transport, use, or disposal of hazardous materials, PAR 1147 will not create a significant hazard to the public or environment through a reasonably foreseeable release of these materials into the environment or cause hazardous emissions within one-quarter mile of an existing or proposed school.

VIII. d) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. Government Code §65962.5 typically refers to a list of facilities that may be subject to Resource Conservation and Recovery Act (RCRA) permits. For any facilities affected by PAR 1147 that are on the Government Code §65962.5 list, it is anticipated that they would continue to manage any and all hazardous materials and hazardous waste, in accordance with federal, state and local regulations, and PAR 1147 would not affect how the affected facilities currently handle their hazardous materials and would not impose changes to their existing practices.

VIII. e) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. Based on the type of equipment affected, PAR 1147 is not expected to increase or create any new hazardous emissions in general, which could adversely affect public/private airports located in close proximity to the affected sites. Implementation of PAR 1147 is not expected to create any additional safety hazards for people residing or working in the project area.

VIII. f) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. PAR 1147 will not impair implementation of, or physically interfere with any adopted emergency response plan or emergency evacuation plan. Any existing commercial or light industrial facilities affected by PAR 1147 will typically have their own emergency response plans. Any new facilities will be required to prepare emergency response and evacuation plans as part of the land use permit review and approval process conducted by local jurisdictions for new development. Emergency response plans are typically prepared in coordination with the local city or county emergency plans to ensure the safety of not only the public (surrounding local communities), but the facility employees as well. Since PAR 1147 does not involve any change in current uses of any hazardous materials, or generate any new hazardous waste, no changes to emergency response plans are anticipated.

Health and Safety Code §25506 specifically requires all businesses handling hazardous materials to submit a business emergency response plan to assist local administering agencies in the emergency release or threatened release of a hazardous material. Business emergency response plans generally require the following:

1. Identification of individuals who are responsible for various actions, including reporting, assisting emergency response personnel and establishing an emergency response team;
2. Procedures to notify the administering agency, the appropriate local emergency rescue personnel, and the California Office of Emergency Services;
3. Procedures to mitigate a release or threatened release to minimize any potential harm or damage to persons, property or the environment;
4. Procedures to notify the necessary persons who can respond to an emergency within the facility;

5. Details of evacuation plans and procedures;
6. Descriptions of the emergency equipment available in the facility;
7. Identification of local emergency medical assistance; and
8. Training (initial and refresher) programs for employees in:
    a. The safe handling of hazardous materials used by the business;
    b. Methods of working with the local public emergency response agencies;
    c. The use of emergency response resources under control of the handler; and
    d. Other procedures and resources that will increase public safety and prevent or mitigate a release of hazardous materials.

In general, every county or city and all facilities using a minimum amount of hazardous materials are required to formulate detailed contingency plans to eliminate, or at least minimize, the possibility and effect of fires, explosion, or spills. In conjunction with the California Office of Emergency Services, local jurisdictions have enacted ordinances that set standards for area and business emergency response plans. These requirements include immediate notification, mitigation of an actual or threatened release of a hazardous material, and evacuation of the emergency area. Adopting PAR 1147 is not expected to hinder in any way with the above business emergency response plan requirements.

VIII. g) No Impact. Since the affected facilities are primarily located in industrial or commercial areas where wildlands are typically not prevalent, risk of loss or injury associated with wildland fires is not expected as a result of implementing PAR 1147.

VIII. h) No Impact. Facilities affected by PAR 1147 must already comply with all local and county requirements for fire prevention and safety. PAR 1147 does not require any activities which would be in conflict with any fire prevention and safety requirements, and thus would not create or increase fire hazards at these existing facilities. Pursuant to local and county fire prevention and safety requirements, facilities are required to maintain appropriate site management practices to prevent fire hazards. PAR 1147 will not interfere with fire prevention practices.

Conclusion

Based upon these considerations, significant adverse hazards and hazardous material impacts are not expected from implementing PAR 1147. Since no significant hazards and hazardous material impacts were identified, no mitigation measures are necessary or required.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
IX.	**HYDROLOGY AND WATER QUALITY.** Would the project:				
a)	Violate any water quality standards, waste discharge requirements, exceed wastewater treatment requirements of the applicable Regional Water Quality Control Board, or otherwise substantially degrade water quality?	☐	☐	☐	☑
b)	Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level (e.g. the production rate of pre-existing nearby wells would drop to a level which would not support existing land uses or planned uses for which permits have been granted)?	☐	☐	☐	☑
c)	Substantially alter the existing drainage pattern of the site or area, including through alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner that would result in substantial erosion or siltation on- or off-site or flooding on- or off-site?	☐	☐	☐	☑
d)	Create or contribute runoff water which would exceed the capacity of existing or planned storm water drainage systems or provide substantial additional sources of polluted runoff?	☐	☐	☐	☑
e)	Place housing or other structures within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map, which would impede or redirect flood flows?	☐	☐	☐	☑

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
f) Expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam, or inundation by seiche, tsunami, or mudflow?	☐	☐	☐	☑
g) Require or result in the construction of new water or wastewater treatment facilities or new storm water drainage facilities, or expansion of existing facilities, the construction of which could cause significant environmental effects?	☐	☐	☐	☑
h) Have sufficient water supplies available to serve the project from existing entitlements and resources, or are new or expanded entitlements needed?	☐	☐	☐	☑
i) Result in a determination by the wastewater treatment provider which serves or may serve the project that it has adequate capacity to serve the project's projected demand in addition to the provider's existing commitments?	☐	☐	☐	☑

Significance Criteria

Potential impacts on water resources will be considered significant if any of the following criteria apply:

<u>Water Demand:</u>

- The existing water supply does not have the capacity to meet the increased demands of the project, or the project would use more than 262,820 gallons per day of potable water.
- The project increases demand for total water by more than five million gallons per day.

<u>Water Quality:</u>

- The project will cause degradation or depletion of ground water resources substantially affecting current or future uses.
- The project will cause the degradation of surface water substantially affecting current or future uses.
- The project will result in a violation of National Pollutant Discharge Elimination System (NPDES) permit requirements.

- The capacities of existing or proposed wastewater treatment facilities and the sanitary sewer system are not sufficient to meet the needs of the project.
- The project results in substantial increases in the area of impervious surfaces, such that interference with groundwater recharge efforts occurs.
- The project results in alterations to the course or flow of floodwaters.

Discussion
PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

IX. a), b), c), d) & g) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. . As discussed above, additional water usage will not result from operating the affected sources at higher NO_x emission levels, compared to existing Rule 1147.

No additional wastewater generation is expected to result from PAR 1147. Further, PAR 1147 has no provision that would require the construction of additional water resource facilities, increase the need for new or expanded water entitlements, or alter existing drainage patterns. PAR 1147 would not substantially deplete groundwater supplies or interfere substantially with groundwater recharge. PAR 1147 would not create or contribute runoff water that would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff. Further, the adoption of PAR 1147 would not create a change in the current volume of existing wastewater streams from the affected facilities. In addition, PAR 1147 is not expected to require additional wastewater disposal capacity, violate any water quality standard or wastewater discharge requirements, or otherwise substantially degrade water quality.

Therefore, PAR 1147 is not expected to involve major construction activities including site preparation, grading, etc., so no changes to storm water runoff, drainage patterns, groundwater characteristics, or flow are expected. Additionally, PAR 1147 is not expected to have significant adverse water demand or water quality impacts.

IX. i) No Impact. PAR 1147 is not expected to change existing operations at affected facilities, nor would it result in the generation of increased volumes of wastewater, because the requirements in PAR 1147 have no effects on water usage or water quality. As a result, there are no potential changes in wastewater volume expected from facilities as a result of the adoption of PAR 1147. It is expected that facilities and operations will continue to handle wastewater generated in a similar manner and with the same equipment as the wastewater that is currently generated. Further, PAR 1147 is not expected to cause affected facilities to violate any water quality standard or wastewater discharge requirements since there would be no additional wastewater volumes generated as a result of adopting PAR 1147.

IX. e), f) & h) No Impact. As discussed above, PAR 1147 would not require construction of new housing, contribute to the construction of new building structures, or require major modifications or changes to existing structures. Further, PAR 1147 is not expected to require additional workers at affected facilities because PAR 1147 does not affect how equipment is operated. Therefore, PAR 1147 is not expected to generate construction of any new structures in 100-year flood areas as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood delineation map and PAR 1147 is not expected to expose people or structures to significant new flooding risks, or make worse any existing flooding risks. Because PAR 1147 would not require construction of new structures or the addition of new employees, PAR 1147 will not affect in any way any potential flood hazards inundation by seiche, tsunami, or mud flow that may already exist relative to existing facilities or create new hazards at existing facilities. Additionally, since PAR 1147 does not require additional water usage or demand, sufficient water supplies are expected to be available to serve the project from existing entitlements and resources, and no new or expanded entitlements would be needed.

Conclusion

Based upon these considerations, significant adverse hydrology and water quality impacts are not expected from implementing PAR 1147. Since no significant hydrology and water quality impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
X. LAND USE AND PLANNING. Would the project:				
a) Physically divide an established community?	☐	☐	☐	☑
b) Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to the general plan, specific plan, local coastal program or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?	☐	☐	☐	☑

Significance Criteria

Land use and planning impacts will be considered significant if the project conflicts with the land use and zoning designations established by local jurisdictions.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

X. a) No Impact. PAR 1147 would not require any new development or require major modifications to buildings or other structures to comply with the new requirements for affected equipment at any of the currently existing facilities beyond what is currently required by Rule 1147. Therefore, PAR 1147 does not include any components that would require physically dividing an established community.

X. b) No Impact. There are no provisions in PAR 1147 that would affect land use plans, policies, or regulations. Land use and other planning considerations are determined by local governments and no land use or planning requirements would be altered by the affected operations beyond what is currently required by Rule 1147. Therefore, as already noted in the discussion in Section IV - Biological Resources, PAR 1147 would not affect any habitat conservation or natural community conservation plans, agricultural resources or operations, and would not create divisions in any existing communities. Present or planned land uses in the region would not be significantly adversely affected as a result of implementing PAR 1147.

Conclusion

Based upon these considerations, significant adverse land use and planning impacts are not expected from implementing PAR 1147. Since no significant land use and planning impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XI. MINERAL RESOURCES. Would the project:				
a) Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?	☐	☐	☐	☑
b) Result in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?	☐	☐	☐	☑

Significance Criteria

Project-related impacts on mineral resources will be considered significant if any of the following conditions are met:

- The project would result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- PAR 1147 results in the loss of availability of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XI. a) & b) No Impact. There are no provisions in PAR 1147 that would result in the loss of availability of a known mineral resource of value to the region and the residents of the state, or of a locally-important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Some examples of mineral resources are gravel, asphalt, bauxite, and gypsum, which are commonly used for construction activities or industrial processes. Since PAR 1147 will only to affect existing operations that do not use or duplicate mineral resources, PAR 1147 does not require and would not have any effects on the use of important minerals, such as those described above. Therefore, no new demand for mineral resources is expected to occur.

Conclusion

Based upon these considerations, significant adverse mineral resources impacts are not expected from implementing PAR 1147. Since no significant mineral resources impacts were identified, no mitigation measures are necessary or required.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XII.	**NOISE.** Would the project result in:				
a)	Exposure of persons to or generation of permanent noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies?	☐	☐	☐	☑
b)	Exposure of persons to or generation of excessive groundborne vibration or groundborne noise levels?	☐	☐	☐	☑
c)	A substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project?	☐	☐	☐	☑
d)	For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public use airport or private airstrip, would the project expose people residing or working in the project area to excessive noise levels?	☐	☐	☐	☑

Significance Criteria

Noise impact will be considered significant if:

- Construction noise levels exceed the local noise ordinances or, if the noise threshold is currently exceeded, project noise sources increase ambient noise levels by more than three decibels (dBA) at the site boundary. Construction noise levels will be considered significant if they exceed federal Occupational Safety and Health Administration (OSHA) noise standards for workers.
- The proposed project operational noise levels exceed any of the local noise ordinances at the site boundary or, if the noise threshold is currently exceeded, project noise sources increase ambient noise levels by more than three dBA at the site boundary.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XII. a) No Impact. As discussed above, PAR 1147 would not require any new development or require major modifications to buildings or other structures to comply with PAR 1147 at any of the currently existing facilities beyond what is currently required by Rule 1147. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. Thus, PAR 1147 is not expected to expose persons to the generation of excessive noise levels above current facility levels. It is expected that any facility affected by PAR 1147 would continue complying with all existing local noise control laws or ordinances.

In commercial environments, Occupational Safety and Health Administration (OSHA) and California-OSHA have established noise standards to protect worker health. It is expected that operators at affected facilities will continue complying with applicable OSHA or Cal/OSHA noise standards, which would limit noise impacts to workers, patrons and neighbors.

XII. b) No Impact. PAR 1147 is not anticipated to expose people to, or generate excessive groundborne vibration or groundborne noise levels since complying with PAR 1147 is not expected to alter operations at affected facilities. Therefore, any existing noise or vibration levels at affected facilities are not expected to change as a result of implementing PAR 1147.

XII. c) No Impact. No increase in periodic or temporary ambient noise levels in the vicinity of affected facilities above levels existing prior to implementing PAR 1147 is anticipated because PAR 1147 would not require heavy-duty diesel-fueled construction-related activities nor would it change the existing activities currently performed by the affected operations. See also the response to items XII.a) and XII.b).

XII. d) No Impact. Even if an affected facility is located near a public/private airport, there are no new noise impacts expected from any of the existing facilities as a result of complying with PAR 1147. Similarly, any existing noise levels at affected facilities are not expected to increase appreciably. Thus, PAR 1147 is not expected to expose people residing or working in the vicinities of public airports to excessive noise levels.

Conclusion

Based upon these considerations, significant adverse noise impacts are not expected from implementing PAR 1147. Since no significant noise impacts were identified, no mitigation measures are necessary or required.

		Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XIII.	**POPULATION AND HOUSING.** Would the project:				
a)	Induce substantial growth in an area either directly (for example, by proposing new homes and businesses) or indirectly (e.g. through extension of roads or other infrastructure)?	☐	☐	☐	☑
b)	Displace substantial numbers of people or existing housing, necessitating the construction of replacement housing elsewhere?	☐	☐	☐	☑

Significance Criteria

Impacts of PAR 1147 on population and housing will be considered significant if the following criteria are exceeded:

- The demand for temporary or permanent housing exceeds the existing supply.
- The proposed project produces additional population, housing or employment inconsistent with adopted plans either in terms of overall amount or location.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XIII. a) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. PAR 1147 is not anticipated to generate any significant adverse effects, either direct or indirect, on the population or population distribution within the SCAQMD's boundaries as no additional workers are anticipated to be required for affected facilities to comply with PAR 1147 which relaxes existing requirements. Human population within the jurisdiction of the SCAQMD is anticipated to grow regardless of implementing PAR 1147. As such, PAR 1147 would not result in changes in population densities or induce significant growth in population.

XIII. b) No Impact. Because PAR 1147 does not require additional employees, PAR 1147 is not expected to result in the creation of any new industry that would affect population growth, directly or indirectly, induce the construction of single- or multiple-family units, or require the displacement of people elsewhere. Affected equipment is anticipated to be operated by the existing labor pool in southern California and would not warrant any new housing.

Conclusion

Based upon these considerations, significant adverse population and housing impacts are not expected from implementing PAR 1147. Since no significant population and housing impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XIV. PUBLIC SERVICES. Would the proposal result in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response times or other performance objectives for any of the following public services:				
a) Fire protection?	☐	☐	☐	☑
b) Police protection?	☐	☐	☐	☑
c) Schools?	☐	☐	☐	☑
d) Parks?	☐	☐	☐	☑
e) Other public facilities?	☐	☐	☐	☑

Significance Criteria

Impacts on public services will be considered significant if the project results in substantial adverse physical impacts associated with the provision of new or physically altered governmental facilities, or the need for new or physically altered government facilities, the construction of which could cause significant environmental impacts, in order to maintain acceptable service ratios, response time or other performance objectives.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XIV. a) & b) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147 and PAR 1147 will not require additional public services beyond what is currently required by Rule 1147. PAR 1147 does not require any action which would alter and, thereby, adversely affect existing public services, or require an increase in governmental facilities or services to support the affected existing facilities. PAR 1147 will not result in the need for new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives because no change in operations is expected to occur at affected facilities.

Because PAR 1147 does not require or involve the use of new hazardous materials or generate new hazardous waste, it will not generate an emergency situation that would require additional fire or police protection, or impact acceptable service ratios or response times.

XIV. c) & d) No Impact. As indicated in discussion under Section XIII - Population and Housing, implementing PAR 1147 would not induce population growth or dispersion because no additional workers are expected to be needed at the existing affected facilities. Therefore, with no increase in local population anticipated as a result of adopting and implementing PAR 1147, additional demand for new or expanded schools or parks is also not anticipated. As a result, no significant adverse impacts are expected to local schools or parks.

Conclusion

Based upon these considerations, significant adverse public service impacts are not expected from implementing PAR 1147. Since no significant public service impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XV. RECREATION.				
a) Would the project increase the use of existing neighborhood and regional parks or other recreational facilities such that substantial physical deterioration of the facility would occur or be accelerated?	☐	☐	☐	☑
b) Does the project include recreational facilities or require the construction or expansion of recreational facilities that might have an adverse physical effect on the environment or recreational services?	☐	☐	☐	☑

Significance Criteria

Impacts to recreation will be considered significant if:

- The project results in an increased demand for neighborhood or regional parks or other recreational facilities.
- The project adversely affects existing recreational opportunities.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XV. a) & b) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. As discussed in Section X - Land Use and Planning, there are no provisions in PAR 1147 that would affect land use plans, policies, or regulations. Land use and other planning considerations are determined by local governments. No land use or planning requirements would be altered by the adoption of PAR 1147, which only affect certain types of combustion equipment. Further, PAR 1147 would not affect population growth or distribution within the SCAQMD's jurisdiction (see Section XIII – Population and Housing), in ways that could increase the demand for or use of existing neighborhood and regional parks or other recreational facilities or require the construction of new or expansion of existing recreational facilities that might have an adverse physical effect on the environment because it would not directly or indirectly increase or redistribute population.

Conclusion

Based upon these considerations, significant adverse recreation impacts are not expected from implementing PAR 1147. Since no significant recreation impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XVI. SOLID AND HAZARDOUS WASTE. Would the project:				
a) Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs?	☐	☐	☐	☑
b) Comply with federal, state, and local statutes and regulations related to solid and hazardous waste?	☐	☐	☐	☑

Significance Criteria

The proposed project impacts on solid and hazardous waste will be considered significant if the following occurs:

- The generation and disposal of hazardous and non-hazardous waste exceeds the capacity of designated landfills.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XVI. a) & b) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. PAR 1147 may require the replacement of burner equipment at the end of its useful life that could generate waste, however, the impacts would not be beyond what is currently required in Rule 1147; therefore, no new solid or hazardous waste impacts specifically associated with PAR 1147 are expected. No substantial change in the amount of solid or hazardous waste streams is expected to occur at affected facilities. The character of solid or hazardous waste streams are not expected to change as a result of the adoption of PAR 1147. PAR 1147 is not expected to increase the volume of solid or hazardous wastes from affected facilities, require additional waste disposal capacity, or generate waste that does not meet applicable local, state, or federal regulations. Potential wastewater impacts are addressed in Section IX- Hydrology and Water Quality.

Conclusion

Based upon these considerations, significant adverse solid and hazardous waste impacts are not expected from implementing PAR 1147. Since no significant solid and hazardous waste impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XVII. TRANSPORTATION AND TRAFFIC. Would the project:				
a) Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and non-motorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit?	☐	☐	☐	☑
b) Conflict with an applicable congestion management program, including but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways?	☐	☐	☐	☑
c) Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks?	☐	☐	☐	☑
d) Substantially increase hazards due to a design feature (e.g. sharp curves or dangerous intersections) or incompatible uses (e.g. farm equipment)?	☐	☐	☐	☑
e) Result in inadequate emergency access?	☐	☐	☐	☑
f) Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities?	☐	☐	☐	☑

Significance Criteria

Impacts on transportation/traffic will be considered significant if any of the following criteria apply:

- Peak period levels on major arterials are disrupted to a point where level of service (LOS) is reduced to D, E or F for more than one month.
- An intersection's volume to capacity ratio increase by 0.02 (two percent) or more when the LOS is already D, E or F.
- A major roadway is closed to all through traffic, and no alternate route is available.
- The project conflicts with applicable policies, plans or programs establishing measures of effectiveness, thereby decreasing the performance or safety of any mode of transportation.
- There is an increase in traffic that is substantial in relation to the existing traffic load and capacity of the street system.
- The demand for parking facilities is substantially increased.
- Water borne, rail car or air traffic is substantially altered.
- Traffic hazards to motor vehicles, bicyclists or pedestrians are substantially increased.
- The need for more than 350 employees
- An increase in heavy-duty transport truck traffic to and/or from the facility by more than 350 truck round trips per day
- Increase customer traffic by more than 700 visits per day.

Discussion

PAR 1147 will resolve current Rule 1147 NO_x emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NO_x limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NO_x emission reductions foregone of up to 0.9 tons per day starting in 2017. However, the emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

XVII. a) & b) No Impact. PAR 1147 will provide relief to businesses by extending the compliance dates for small and low use equipment. Compliance dates will be extended for the expected life of these units (35 years) or when the equipment is replaced, rebuilt or moved to a different facility. This change will reduce compliance cost for affected businesses. The amendment will also change the emission limit for specific categories of equipment (e.g., incinerator section of burn off ovens and small units less than 325,000 Btu/hour) to address technical feasibility of meeting a 30 ppm NO_x limit. Therefore, it is not expected that the affected facilities will need to change their current operations in order to comply with PAR 1147. PAR 1147 would not change or cause additional transportation demands or services because no change in operations at affected facilities is expected to occur beyond what is currently required by Rule 1147. Therefore, PAR 1147 would not increase traffic or adversely impact the existing traffic load and capacity of the street system, as the amount of product to be delivered is not anticipated to change nor generate additional services to affect transportation demand. Because PAR 1147 does not require the immediate replacement of equipment, no increase in material delivery trips is expected as a result of PAR 1147.

Since no construction-related trips and no additional operational-related trips per facility are anticipated (see Section III – Air Quality and Greenhouse Gases), the adoption of PAR 1147 is not expected to significantly adversely affect circulation patterns on local roadways or the level of service at intersections near affected facilities. Since no construction is required, no significant construction traffic impacts are anticipated.

XVII. c) No Impact. PAR 1147 will not require operators of existing facilities to construct buildings or other structures or change the height and appearance of the existing structures, such that they could interfere with flight patterns. Therefore, adoption of PAR 1147 is not expected to adversely affect air traffic patterns. Further, PAR 1147 will not affect in any way air traffic in the region because it will not require transport of any PAR 1147 materials by air.

XVII. d) No Impact. No physical modifications are expected to occur by adopting PAR 1147 at the affected facilities. Additionally, no offsite modifications to roadways are anticipated for PAR 1147 that would result in an additional design hazard or incompatible uses.

XVII. e) No Impact. Equipment replacements or retrofits associated with adopting PAR 1147 are not expected to occur at the potentially affected existing facilities. Therefore, no changes to emergency access at or in the vicinity of the affected facilities would be expected. As a result, PAR 1147 is not expected to adversely impact emergency access.

XVII. f) No Impact. No changes to the parking capacity at or in the vicinity of the affected facilities are expected with adopting PAR 1147. Adoption of PAR 1147 does not change existing operations, so no new workers at affected facilities or area sources are expected. Since adoption of PAR 1147 is not expected to require additional workers, no traffic impacts are expected to occur and additional parking capacity will not be required. Therefore, PAR 1147 is not expected to adversely impact on- or off-site parking capacity. PAR 1147 has no provisions that would conflict with alternative transportation, such as bus turnouts, bicycle racks, et cetera.

Conclusion

Based upon these considerations, significant adverse transportation and traffic impacts are not expected from implementing PAR 1147. Since no significant transportation and traffic impacts were identified, no mitigation measures are necessary or required.

	Potentially Significant Impact	Less Than Significant With Mitigation	Less Than Significant Impact	No Impact
XVIII. MANDATORY FINDINGS OF SIGNIFICANCE.				
a) Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self-sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory?	☐	☐	☐	☑
b) Does the project have impacts that are individually limited, but cumulatively considerable? ("Cumulatively considerable" means that the incremental effects of a project are considerable when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects)	☑	☐	☐	☐
c) Does the project have environmental effects that will cause substantial adverse effects on human beings, either directly or indirectly?	☑	☐	☐	☐

XVIII. a) No Impact. As discussed in Section IV - Biological Resources, PAR 1147 is not expected to significantly adversely affect plant or animal species or the habitat on which they rely because PAR 1147 affects specific types of combustion equipment, which are primarily located at existing established facilities. The installation of new equipment is anticipated to occur at existing affected facilities, but not beyond what is currently required by Rule 1147. In addition, all of the currently affected facilities are located at sites that have already been greatly disturbed and that currently do not support such habitats. PAR 1147 is not expected to induce construction of any new land use projects that could affect biological resources.

XVIII. b) Potential Significant Impact. Based on the foregoing analyses, some project-specific significant adverse environmental impacts in the answers for air quality are marked significant for project-specific adverse impacts (see Section III). The cumulative effects of PAR 1147 for the topic of air quality have been identified as potentially significant because the impacts are not known at this time and will be evaluated for project-specific and cumulative adverse effects in the Draft EA. Therefore, potentially significant air quality impacts identified for project-specific adverse impacts are also potentially significant for cumulative adverse impacts.

No environmental topics were identified as 'Less Than Significant Impact' or 'Less Than Significant with Mitigation'. The environmental topics identified has having 'No Impact' include aesthetics, agriculture and forestry resources, biological resources, cultural resources, energy, geology and soils, hazards and hazardous materials, hydrology and water quality, land use and planning, mineral resources, noise, population and housing, public services, recreation, solid and hazardous waste, and transportation and traffic (see Sections I., II., IV., V., VI., VII., VIII., IX., X., XI., XII., XIII., XIV., XV., XVI., and XVII.). SCAQMD significance thresholds are the same for project-specific impacts and cumulative impacts; therefore, environmental topic answers that are identified as 'No Impact' for project-specific impacts would not be expected to make any contribution to potential cumulative impacts whatsoever. Therefore, environmental topic identified as 'No Impact' for project-specific impacts are not expected to be significant for cumulative adverse impacts; therefore, no mitigation is necessary. Therefore, the topic areas identified as 'No Impact' will not be evaluated further in the Draft EA.

XVIII. c) Potential Significant Impact. Some air quality adverse impacts from implementing PAR 1147 were identified as potentially significant and will be evaluated in the Draft EA (see Section III.). The direct and indirect adverse effects upon human beings for these potentially significant adverse impacts will be evaluated in the Draft EA.

Conclusion

As previously discussed in Sections I through XVIII, the proposed project has no potential to cause significant adverse environmental effects for all areas except for air quality (see Section III). Potentially significant adverse air quality impacts from the adoption and implementation of PAR 1147 will be further evaluated in the Draft EA.

APPENDIX A

PROPOSED AMENDED RULE 1147

RULE 1147 NOx REDUCTIONS FROM MISCELLANEOUS SOURCES

(a) Purpose and Applicability

The purpose of this rule is to reduce nitrogen oxide emissions from gaseous and liquid fuel fired combustion equipment as defined in this rule. This rule applies to ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units and other combustion equipment with nitrogen oxide emissions that require a District permit and are not specifically required to comply with a nitrogen oxide emission limit by other District Regulation XI rules. This rule does not apply to solid fuel-fired combustion equipment, internal combustion engines subject to District Rule 1110.2, turbines, food ovens, charbroilers, or boilers, water heaters, thermal fluid heaters and enclosed process heaters subject to District Rules 1109, 1146, 1146.1, or 1146.2 and equipment subject to District Rules 1111, 1112, 1117, 1118, 1121, ~~or~~ 1135, or 1153.1.

(b) Definitions

(1) ANNUAL CAPACITY FACTOR means the ratio of the ANNUAL HEAT INPUT of a unit in a calendar year to the amount of fuel it could have burned if it had operated at the rated heat input capacity for 100 percent of the time during the calendar year.

(2) ANNUAL HEAT INPUT means the actual amount of heat released by fuels burned in a unit during a calendar year, based on the fuel's higher heating value.

(3) BTU means British thermal unit or units.

(4) COMBUSTION MODIFICATION means replacement of a burner(s) or any modification of the burner, fuel system or combustion air supply that changes the RATED HEAT INPUT CAPACITY of the burner(s).

(5) FOOD OVEN means an oven, cooker, dryer, roaster, or other fuel-fired unit, excluding fryer, used to heat, ~~or~~ cook, dry, roast, or prepare food, food products, or products used for making beverages for human consumption.

(6) HEATER means any combustion equipment that is fired with gaseous and/or liquid fuels and which transfers heat from combusted fuel to materials or air contained in the unit or in an adjoining cabinet, container or structure. Heater does not include any boiler or PROCESS HEATER designed to transfer heat to water or process streams that is subject to any NOx emission limits of District Rules 1109, 1146, 1146.1 or 1146.2, and does not include any internal combustion engine or turbine.

(7) HEAT INPUT means the higher heating value of the fuel to the unit measured as BTU per hour.

(8) HEAT OUTPUT means the enthalpy of the working fluid output of the unit.

(9) INFRARED BURNER means a burner with:

(A) Ceramic, metal fiber, sintered metal, or perforated metal flame-holding surface;

(B) More than 50% of the heat output as infrared radiation and that is operated in a manner where the zone including and above the flame-holding surface is red and does not produce observable blue or yellow flames in excess of ½ inch (13 mm) in length; and

(C) A RATED HEAT INPUT CAPACITY per square foot of flame holding surface of 100,000 BTU per hour or less.

(10~~9~~) IN-USE UNIT means any UNIT that is demonstrated to the Executive Officer that it was in operation at the current location prior to January 1, 2010.

(11~~0~~) MAKE-UP AIR HEATER means a UNIT used to heat incoming air in order to maintain the temperature of a spray booth, container, room or other enclosed space where a person is working including spray booths that are also used for drying coatings and auto body spray booths with an adjacent contiguous section for drying automobile coatings. A MAKE-UP AIR HEATER is not a burner used to heat an oven, dryer, heater or other unit where workers are not present during heating.

(12~~1~~) NOx EMISSIONS means the sum of nitrogen oxide and nitrogen dioxide in the flue gas, collectively expressed as nitrogen dioxide.

(13~~2~~) PROCESS HEATER means any equipment that is fired with gaseous and/or liquid fuels and which transfers heat from combusted fuel to water or process streams. PROCESS HEATER does not include any fryer or any furnace, kiln or oven used for melting, heat treating, annealing, drying, curing, baking, cooking, calcining, or vitrifying; any heated tank; or any unfired waste heat recovery heater that is used to recover sensible heat from the exhaust of any combustion equipment.

(14~~3~~) PROTOCOL means a South Coast Air Quality Management District approved test protocol for determining compliance with emission limits for applicable equipment.

(15~~4~~) RATED HEAT INPUT CAPACITY means the gross HEAT INPUT of the combustion UNIT specified on a permanent rating plate attached by the manufacturer to the device. If the UNIT has been altered or modified such that its gross HEAT INPUT is higher or lower than the rated HEAT INPUT capacity specified on the original manufacturer's permanent rating plate, the new gross HEAT INPUT shall be considered as the rated HEAT INPUT capacity.

(16~~5~~) REMEDIATION UNIT means a device used to capture or incinerate air toxics, VOCs or other combustible vapors extracted from soil or water.

(17~~6~~) RESPONSIBLE OFFICIAL means:

(A) For a corporation: a president or vice-president of the corporation in charge of a principal business function or a duly authorized person who performs similar policy-making functions for the corporation; or

(B) For a partnership or sole proprietorship: general partner or proprietor, respectively.

(C) For a government agency: a duly authorized person

(18~~7~~) TENTER FRAME DRYER is a cloth dryer that holds the edges of the material as it is dried in order to control shrinkage.

(19~~8~~) THERM means 100,000 BTU.

(20~~19~~) UNIT means any oven, dryer, dehydrator, heater, kiln, calciner, furnace, crematory, incinerator, heated pot, cooker, roaster, fryer, heated tank and evaporator, distillation unit, afterburner, degassing unit, vapor incinerator, catalytic or thermal oxidizer, soil or water remediation units and other combustion equipment with nitrogen oxide emissions requiring a District permit and not specifically required to comply with a NOx emission limit by other District Regulation XI rules. UNIT does not mean any solid fuel fired combustion equipment, internal combustion engine subject to District

Rule 1110.2, turbine, charbroiler, or boiler, water heater, thermal fluid heaters or enclosed process heater subject to District Rules 1109, 1146, 1146.1, or 1146.2 or equipment subject to District Rules 1111, 1112, 1117, 1118, 1121, ~~or~~ 1135, or 1153.1.

(21~~0~~) VAPOR INCINERATOR means a furnace, afterburner, or other device for burning and destroying air toxics, VOCs or other combustible vapors in gas or aerosol form in gas streams.

(c) Requirements

(1) On or after January 1, 2010 any person owning or operating a unit subject to this rule shall not operate the unit in a manner that exceeds the applicable nitrogen oxide emission limit specified in Table 1 at the time a District permit is required for operation of a new, relocated or modified unit or, for in-use units, in accordance with the compliance schedule in Table 2, or at the time of a combustion modification.

Table 1 – NO_x Emission Limit

Equipment Category(ies)	**NOx Emission Limit** PPM @ 3% O_2, dry or Pound/mmBtu heat input		
	Process Temperature		
Gaseous Fuel-Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F
Asphalt Manufacturing Operation	40 ppm	40 ppm	
Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer or Vapor Incinerator [1]	~~3~~60 ppm or 0.073~~6~~ lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Crematory or Incinerator	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Dual Chamber Burn-off Furnace, Burnout Oven, Incinerator or Crematory with Integrated Afterburner	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Evaporator, Fryer, Heated Process Tank, or Parts Washer	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	
Metal Heat Treating, Metal Melting Furnace, Metal Pot, or Tar Pot	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Oven, Dehydrator, Dryer, Heater, Kiln, ~~Crematory, Incinerator,~~ Calciner, Cooker, Roaster, Furnace, or Heated Storage Tank with unit heat rating ≥ 325,000 BTU/hour	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Make-Up Air Heater or other Air Heater located outside of building with temperature controlled zone inside building	30 ppm or 0.036 lb/mmBtu		
Tenter Frame or Fabric or Carpet Dryer	30 ppm or 0.036 lb/mmBtu		
Other Unit or Process Temperature with unit heat rating ≥ 325,000 BTU/hour	30 ppm or 0.036 lb/mmBtu	30 ppm or 0.036 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Oven, Dehydrator, Dryer, Heater, Kiln, Calciner, Cooker, Roaster, Furnace, Heated Storage Tank or Other Unit with unit heat rating < 325,000 BTU/hour	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu	60 ppm or 0.073 lb/mmBtu
Liquid Fuel-Fired Equipment	≤ 800° F	> 800 ° F and < 1200° F	≥ 1200 ° F
All liquid fuel-fired Units	40 ppm or 0.053 lb/mmBtu	40 ppm or 0.053 lb/mmBtu	60 ppm or 0.080 lb/mmBtu

1. Emission limit applies to burners in units fueled by 100% natural gas that are used to incinerate air toxics, VOCs, or other vapors; or to heat a unit. The emission limit applies solely when burning 100% fuel and not when the burner is incinerating air toxics, VOCs, or other vapors. The unit shall be tested or certified to meet the emission limit while fueled with natural gas.

Table 2 – Compliance Schedule for In-Use Units

Equipment Category(ies)	Submit Permit Application	Unit Shall Be in Compliance
Remediation UNIT manufactured prior to 1998	Seven months prior to combustion modification or change of location.	Upon combustion modification or change of location beginning March 1, 2012
Tar Pot		All new permit applications beginning January 1, 2013
Afterburner, degassing unit, catalytic oxidizer, thermal oxidizer, vapor incinerator, evaporator, ~~food oven,~~ fryer, heated process tank, parts washer or spray booth make-up air heater manufactured prior to 1998	December 1, 2013	July 1, 2014
Other UNIT manufactured prior to 1986	December 1, 2011	July 1, 2012
Other UNIT manufactured prior to 1992	December 1, 2011	July 1, 2012
Other UNIT manufactured prior to 1998	December 1, 2012	July 1, 2013
Any UNIT manufactured after 1997	December 1 of the year prior to the compliance date	July 1 of the year the unit is 15 years old

(2) Unit age shall be based on:

(A) The original date of manufacture as determined by:

(i) Original manufacturer's identification or rating plate permanently fixed to the equipment. If not available, then;

(ii) Invoice from manufacturer for purchase of equipment. If not available, then;

(iii) Information submitted to the District ~~AQMD~~ with prior permit applications for the specific unit. If not available, then;

(iv) Unit is deemed by the District ~~AQMD~~ to be 20 years old as of July 1, 2012; or

(B) The date that operations start for a tunnel kiln or crematory rebuilt prior to January 1, 2010 with new burner(s) as determined by:

(i) Production or fuel usage records after burner installation, and

(ii) Invoice for burner(s) installation. If not available, then;

(iii) Invoice for burner(s) purchase, If not available, then;

(iv) Manufacture date of burner(s) as identified by an attached manufacturers identification or rating plate or date stamp.

(3) In accordance with the schedule in the permit, owners or operators of units shall determine compliance with the emission limit specified in Table 1 using a District approved test protocol. The test protocol shall be submitted to the District at least 90 days prior to the scheduled test and approved by the District Source Testing Division.

(4) Notwithstanding the requirements of paragraph (c)(1), units with combustion modifications completed prior to December 5, 2008 and after January 1, 2000 that resulted in replacement of more than 75% of the rated heat input capacity shall comply with the applicable emission limit specified in Table 1 of paragraph (c)(1) ten years from the date the modification was performed.

(5) The date a combustion modification, as specified in paragraphs (c)(1) and (c)(4), is performed; shall be determined according to subparagraph (c)(2)(B), if not available, then subparagraph (c)(2)(C).

(6) Notwithstanding the requirements of paragraph (c)(1), an in-use unit with a District permit to construct or permit to operate prior to January 1, 2010~~,~~ or~~and~~ an afterburner, degassing unit, thermal oxidizer, catalytic oxidizer, vapor incinerator, or spray booth make-up air heater installed with a District permit prior to March 1, 2012 with emissions of less than one pound per day ~~or less~~ of nitrogen oxides, may defer compliance with the applicable emission limit specified in Table 1 of paragraph (c)(1) until a combustion modification; the unit is replaced, relocated, or rebuilt; or December 1 of the year the unit is 35 years old. A unit with NOx emissions less than one pound per day that becomes 35 years old before December 1, 2017, shall comply with the emission limit on and after December 1, 2018. The age of the unit shall be determined according to subparagraph (c)(2)(A)~~for up to five years from the applicable compliance date in Table 2 of (c)(1)~~. NOx emissions of less than one pound per day ~~or less~~ shall be demonstrated by compliance with one of the following requirements:

~~(A) A unit has a rated heat input capacity of 400,000 Btu or less.~~

~~(B) The unit as of September 9, 2011 has a NOx permit emission limit of one pound per day or less, a permit condition with a process~~

~~limit that results in one pound per day or less of NOx emissions including but not limited to fuel use, material throughput or operating schedule, or actual operations that results in one pound per day or less of NOx emissions. Daily operating records of unit fuel use or process rate and daily operating hours demonstrating that starting January 1, 2012 until the date of compliance, the unit has a maximum emission rate of 1 pound of NOx per day.~~

(A) A rated heat input capacity of less than 325,000 BTU per hour;

(B) A permit condition that limits NOx emissions to less than 1 pound per day;

(C) Monthly recordkeeping of unit use documenting average emissions of less than one pound per day with a unit-specific non-resettable time meter or a non-resettable unit fuel meter with fuel use corrected to standard temperature and pressure. Owners or operators of units with installed calibrated non-resettable totalizing time or fuel meters may elect to comply with the requirements of (c)(6) by ~~requesting, no later than January 1, 2012, unit permit conditions of limits on operating hours per calendar month and/or a fuel meter and a limit on the amount of fuel use per~~ demonstrating each calendar month ~~so~~ that monthly NOx emissions are less than 22~~30~~ pounds ~~or less~~. Monthly emissions with a time meter shall be calculated using the unit's maximum hourly emission rate in pounds multiplied by the hours of operation each calendar month. The maximum hourly emission rate shall be equal to the rated heat input capacity of the unit multiplied by the unit's emissions at the rated heat input capacity in pound per million Btu. Monthly emissions calculated with a fuel meter shall be equal to the unit's emission rate per unit of fuel multiplied by the amount of fuel, corrected to standard temperature and pressure, used that calendar month~~.~~;

(D) Daily recordkeeping of unit operation and the following specified rated heat input capacities operating less than or equal to the specified number of hours per day:

Table 3 – Small and Low Use Unit Daily Operating Limits

Unit Rating (Btu/hour)	Daily Hour Limit
325,000 to 400,000	16
400,001 to 500,000	14
500,001 to 800,000	8
800,001 to 1,000,000	6
1,000,001 to 1,200,000	5

(E) Daily recordkeeping of unit operation and the following specified rated heat input capacities operating less than or equal to the specified number of hours per calendar month:

Table 4 – Small and Low Use Unit Monthly Operating Limits

Unit Rating (Btu/hour)	Monthly Hour Limit
325,000 to 400,000	352
400,001 to 500,000	308
500,001 to 800,000	176
800,001 to 1,000,000	132
1,000,001 to 1,200,000	110

(F) Daily unit natural gas use less than or equal to 7,692 cubic feet per day at standard temperature and pressure, documented by daily recordkeeping of gas consumption with a non-resettable fuel meter.

Owners or operators of units complying under this paragraph that fail to continuously demonstrate compliance with the applicable heat input rating, permit condition, or daily or monthly requirements of this paragraph shall comply with the applicable emission limit in Table 1 by the applicable compliance date in Table 2 or within 210 days from the date the unit first fails to continuously comply with the daily or monthly emission limit whichever is later. A unit that must demonstrate compliance with an emission limit pursuant to this provision shall comply with the applicable emission limit for the life of the unit.

(7) On or after January 1, 2010, any person owning or operating a unit subject to this rule shall perform combustion system maintenance in accordance with the manufacturer's schedule and specifications as identified in the manual and other written materials supplied by the manufacturer or distributor. The owner or operator shall maintain on site at the facility where the unit is being operated a copy of the manufacturer's, distributor's, installer's or maintenance company's written maintenance schedule and instructions and retain a record of the maintenance activity for a period of not less than three years. The owner or operator shall maintain on site at the facility where the unit is being operated a copy of the District certification or District approved source test reports, conducted by an independent third party, demonstrating the specific unit complies with the emission limit. The source test report(s) must identify that the source test was conducted pursuant to a District approved protocol. The model and serial numbers of the specified unit shall clearly be indicated on the source test report(s). The owner or operator shall maintain on the unit in an accessible location a permanent rating plate. The maintenance instructions, maintenance records and the source test report(s) or District certification shall be made available to the Executive Officer upon request.

(8) Any person owning or operating a unit subject to this rule complying with Table 1 using pounds per million BTU, shall install and maintain in service non-resettable, totalizing, fuel meters for each unit's fuel(s) prior to the compliance determination specified in paragraph (c)(3). Owners or operators of a unit with a combustion system that operates at only one firing rate that comply with an emission limit using pounds per million BTU shall install a non-resettable, totalizing, time or fuel meter for each fuel.

(9) Meters that require electric power to operate shall be provided a permanent supply of electric power that cannot be unplugged, switched off, or reset except by the main power supply circuit for the building and associated

equipment or the unit's safety shut-off switch. Any person operating a unit subject to this rule shall not shut off electric power to a unit meter unless the unit is not operating and is shut down for maintenance or safety.

(10) On or before the compliance date, the owner or operator of a unit shall demonstrate compliance with the applicable emission limit in Table 1 pursuant to the provisions of subdivisions (d) or (e).

(11) Compliance by Certification

For units that do not allow adjustment of the fuel and combustion air for the combustion system by the owner or operator, and upon approval by the Executive Officer, an owner or operator may demonstrate compliance with the emission limit and demonstration requirement of this subdivision by certification granted to the manufacturer for any model of equipment sold for use in the District. Any unit certified pursuant to subdivision (e) shall be deemed in compliance with the emission limit in Table 1 and demonstration requirement of this subdivision, unless a District source test shows non-compliance.

(12) Identification of Units

(A) New Manufactured Units

The manufacturer shall display the model number and the rated heat input capacity of the unit complying with subdivision (c) on a permanent rating plate. The manufacturer shall also display the District certification status on the unit when applicable.

(B) Modified Units

The owner or operator of a unit with a modified combustion system (new or modified burners) shall display the new rated heat input capacity on a new permanent supplemental rating plate installed in an accessible location on the unit or burner. The gross heat input shall be based on the maximum fuel input corrected for fuel heat content, temperature and pressure. Gross heat input shall be demonstrated by a calculation based on fuel consumption recorded by an in-line fuel meter by the manufacturer or installer.

(13) The owner or operator shall maintain on site a copy of all documents identifying the unit's rated heat input capacity for as long as the unit is retained on-site. The rated heat input capacity shall be identified by a manufacturer's or distributor's manual or invoice and a permanent rating

plate attached to the unit. If a unit is modified, the rated heat input capacity shall be calculated pursuant to subparagraph (c)(12)(B). The documentation of rated heat input capacity for modified units shall include the name of the company and person modifying the unit, a description of all modifications, the dates the unit was modified and calculation of rated heat input capacity. The documentation for modified units shall be signed by the highest ranking person modifying the unit.

~~(14) Alternate Compliance Plans~~

~~(A) Owners or operators of facilities with five or more in-use units with permit emissions greater than one pound per day NOx that will require burner modifications may submit an alternate compliance plan by January 1, 2012 to phase-in compliance of all units starting April 1, 2012 and ending before January 1, 2015. The alternate compliance plan shall identify the units included in the plan and a schedule identifying when each unit will comply with the emission limit and the compliance determination for each unit will be completed. At least one unit shall be modified to comply with the applicable emission limit of this rule by April 1, 2012. Each year thereafter, a minimum of 20 percent of additional units and no less than one unit shall be modified to comply with the applicable emission limit. All units must comply with the applicable emission limit of this rule before January 1, 2015.~~

~~(B) Owners or operators of facilities with pollution control unit(s) in series with process unit(s) (e.g., an oven and afterburner) that have NOx emissions greater than one pound per day and different compliance dates may elect to synchronize compliance of all units in the series on one date no later than December 1, 2013.~~

(d) Compliance Determination

(1) All compliance determinations pursuant to paragraph (c)(6) shall be calculated:

(A) Using a District approved test protocol averaged over a period of at least 15 and no more than 60 consecutive minutes;

(B) After unit start up; and

(C) In the unit's as-found operating condition.

Each compliance determination shall be made in the maximum heat input range at which the unit normally operates. An additional compliance determination shall be made using a heat input of less than 35% of the rated heat input capacity for any of the following types of units with process temperature less than 1200 °F that operate with variable heat input that falls below 50% rated heat input capacity during normal operation: Make-Up Air Heater, other Air Heater located outside of process building, Oven, Dehydrator, Dryer, Tenter-Frame Dryer, Fabric Dryer, Carpet Dryer, Heater, Cooker, Roaster, non-metallurgical Furnace, or Heated Storage Tank.

For compliance determinations after the initial approved test, the operator is not required to resubmit a protocol for approval if: there is a previously approved protocol and the unit has not been altered in a manner that requires a permit alteration; and rule or permit emission limits have not ~~changed~~ become more stringent since the previous test.

(2) All parts per million emission limits specified in subdivision (c) are referenced at 3 percent volume stack gas oxygen on a dry basis.

(3) Compliance with the NO_X emission limits of subdivision (c) and determination of stack-gas oxygen and carbon dioxide concentrations for this rule shall be determined according to the following procedures:

(A) District Source Test Method 100.1 – Instrumental Analyzer Procedures for Continuous Gaseous Emission Sampling (March 1989); or

(B) ASTM Method D6522-00 – Standard Test Method for Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Concentrations in Emissions from Natural Gas-Fired Reciprocating Engines, Combustion Turbines, Boilers, and Process Heaters Using Portable Analyzers; or

(C) United States Environmental Protection Agency Conditional Test Method CTM-030 – Determination of Nitrogen Oxides, Carbon Monoxide, and Oxygen Emissions from Natural Gas-Fired Engines, Boilers and Process Heaters Using Portable Analyzers; or

(D) District Source Test Method 7.1 – Determination of Nitrogen Oxide Emissions from Stationary Sources (March 1989); and

(E) District Source Test Method 10.1 – Carbon Monoxide and Carbon Dioxide by Gas Chromatograph/Non-Dispersive Infrared Detector (GC/NDIR) – Oxygen by Gas Chromatograph-Thermal Conductivity (GC/TCD) (March 1989); or

(F) Any alternative test method determined approved before the test in writing by the Executive Officers of the District, the California Air Resources Board and the United States Environmental Protection Agency.

(4) For any operator who chooses to comply using pound per million Btu, NO_X emissions in pounds per million Btu of heat input shall be calculated using procedures in 40 CFR Part 60, Appendix A, Method 19, Sections 2 and 3.

(5) Records of source tests shall be maintained for ten years and made available to District personnel upon request. Emissions determined to exceed any limits established by this rule through the use of any of the test methods specified in subparagraphs (d)(3)(A) through (d)(3)(F) shall constitute a violation of this rule.

(6) All compliance determinations shall be made using an independent contractor to conduct testing, which is approved by the Executive Officer under the Laboratory Approval Program for the applicable test methods.

(7) For equipment with two or more units in series or multiple units with a common exhaust or units with one dual purpose burner that both heats the process and incinerates VOC, toxics or PM, the owner or operator may demonstrate compliance with the emission limits in Table 1 by one of the following:

(A) Test each unit separately and demonstrate each unit's compliance with the applicable limit, or

(B) Test only after the last unit in the series and at the end of a common exhaust for multiple units~~ or dual purpose burner~~, when all units are operating, and demonstrate that the series of units either meet:

(i) The lowest emission limit in Table 1 applicable to any of the units in series, or

(ii) A heat input weighted average of all the applicable emission limits in Table 1 using the following calculation.

$$\textbf{Weighted Limit} = \frac{\Sigma\,[\,(EL_X)*(Q_X)\,]}{\Sigma\,[\,Q_X\,]}$$

Where:

EL_X = emission limit for unit X

Q_X = total heat input for unit X during test

(e) Certification

(1) Unit Certification

For units that do not allow adjustment of the fuel and combustion air for the combustion system by the owner or operator, any manufacturer or distributor that distributes for sale or sells units or burner systems for use in the District may elect to apply to the Executive Officer to certify such units or burner systems as compliant with subdivision (c).

(2) Manufacturer Confirmation of Emissions

Any manufacturer's application to the Executive Officer to certify a model of equipment as compliant with the emission limit and demonstration requirement of subdivision (c) shall obtain confirmation from an independent contractor that is approved by the Executive Officer under the Laboratory Approval Program for the necessary test methods prior to applying for certification that each unit model complies with the applicable requirements of subdivision (c). This confirmation shall be based upon District approved emission tests of standard model units and a District approved protocol shall be adhered to during the confirmation testing of all units subject to this rule. Emission testing shall comply with the requirements of paragraphs (d)(1) through (d)(5) except emission determinations shall be made at 100% rated heat input capacity and an additional emission determination shall be made using a heat input of less than 35% of the rated heat input capacity for any Afterburner, Degassing Unit, Remediation Unit, Thermal Oxidizer, Catalytic Oxidizer, Vapor Incinerator, Make-Up Air Heater, other Air Heater located outside of process building, Oven, Dehydrator, Dryer, Tenter-Frame Dryer, Fabric

Dryer, Carpet Dryer, Heater, Kiln, Crematory, Incinerator, Calciner, Cooker, Roaster, non-metallurgical Furnace, or Heated Storage Tank.

(3) When applying for unit(s) certification, the manufacturer shall submit to the Executive Officer the following:

(A) A statement that the model is in compliance with subdivision (c). The statement shall be signed and dated by the manufacturer's responsible official and shall attest to the accuracy of all statements;

(B) General Information

(i) Name and address of manufacturer,

(ii) Brand name, if applicable,

(iii) Model number, as it appears on the unit rating plate; and

(iv) Rated Heat Input Capacity, gross output of burner(s) and number of burners;

(C) A description of each model being certified; and

(D) A source test report verifying compliance with the applicable emission limit in subdivision (c) for each model to be certified. The source test report shall be prepared by the confirming independent contractor and shall contain all of the elements identified in the District approved Protocol for each unit tested. The source test shall have been conducted no more than ninety (90) days prior to the date of submittal to the Executive Officer.

(4) When applying for unit certification, the manufacturer shall submit the information identified in paragraph (e)(3) no more than ninety (90) days after the date of the source test identified in subparagraph (e)(3)(D) and at least 120 days prior to the date of the proposed sale and installation of any District certified unit.

(5) The Executive Officer shall certify a unit model which complies with the provisions of subdivision (c) and of paragraphs (e)(2), (e)(3), and (e)(4).

(6) Certification status shall be valid for five years from the date of approval by the Executive Officer. After the fifth year, recertification shall be required by the Executive Officer according to the requirements of paragraphs (e)(2), (e)(3), and (e)(4).

(f) Enforcement

(1) The Executive Officer may inspect certification records and unit installation, operation, maintenance, repair, combustion modification and test records of owners, operators, manufacturers, distributors, retailers, and installers of units located in the District, and conduct such tests as are deemed necessary to ensure compliance with this rule. Tests shall include emission determinations, as specified in paragraph (d)(1) to (d)(4), of a random sample of any category of units subject to this rule.

(2) An emission determination specified under paragraph (f)(1) that finds emissions in excess of those allowed by this rule or permit conditions shall constitute a violation of this rule.

(g) Exemptions

(1) The provisions of this rule shall not apply to units:

(A) subject to the nitrogen oxide limits of District Rules 1109, 1110.2, 1111, 1112, 1117, 1121, 1134, 1135, 1146, 1146.1, ~~or~~ 1146.2, or 1153.1; or

(B) located at RECLAIM facilities.

(2) The provisions of this rule shall not apply to charbroilers or food ovens.

(3) The provisions of this rule shall not apply to:

(A) Flares subject to District Rule 1118;

(B) Flares, afterburners, degassing units, thermal or catalytic oxidizers or vapor incinerators in which a fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gas, is used only to maintain a pilot for vapor ignition or is used for five minutes or less to bring a unit up to operating temperature;

(C) Municipal solid waste incinerators with a District permit operating before December 5, 2008;

(D) An afterburner or vapor incinerator with a District permit operating before December 5, 2008 that has an integrated thermal fluid heat exchanger that captures heat from the afterburner or vapor incinerator and an oven or furnace exhaust in order to reduce fuel consumption by an oven or the afterburner or vapor incinerator; or

(E) A flare, afterburner, degassing unit, remediation unit, thermal oxidizer, catalytic oxidizer or vapor incinerator process in which ~~a fuel, including but not limited to natural gas, propane, butane or~~

~~liquefied petroleum gas, is mixed with~~ particulate matter, air toxics, VOCs, landfill gas, digester gas or other combustible vapors are mixed in the unit's burner with primary combustion air or fuel, including but not limited to natural gas, propane, butane or liquefied petroleum gas, prior to incineration in the unit, in order to maintain vapor concentration above the upper explosion limit or above a manufacturer specified limit in order to maintain combustion or temperature in the unit. This exemption does not apply to a regenerative thermal or catalytic oxidizer unit with a burner ~~with a separate fuel line~~ used to heat up or maintain temperature of the~~a~~ unit or a unit that incinerates particulate matter, air toxics, VOCs or other combustible vapors in a gas stream moving past the burner flame.

(4) ~~New a~~Afterburners, degassing units, thermal oxidizers, catalytic oxidizers, vapor incinerators, and spray booth make-up air heaters installed for use at a specific facility after December 5, 2008 and before March 1, 2012, are exempt from the emission limit in Table 1 until July 1 of the year the unit is 15 years old.

(5) ~~New or relocated r~~Remediation units installed after December 5, 2008 and before March 1, 2012, are exempt from the emission limit in Table 1 until a combustion modification or change of location on or after January 1, 2012.

(6) ~~New food ovens, f~~Fryers, ~~heated process tanks, parts washers, and evaporators~~ installed after December 5, 2008 and operating before January 1, 2014, are exempt from the emission limit in Table 1 until July 1 of the year the unit is 15 years old.

(7) Remediation units are exempt from the applicable emission limit in Table 1 while fueled with propane, butane or liquefied petroleum gas in a location where natural gas is not available. Remediation units must comply with the emission limit when natural gas is available and while fueled with natural gas.

(8) The provisions of paragraphs (c)(1) and (c)(3) of this rule shall not apply to any evaporator, heated process tank, or parts washer with a District permit issued and operating prior to January 1, 2014 until a combustion modification or the unit is replaced, relocated, or rebuilt.

(9) The provisions of paragraph (c)(3) of this rule shall not apply to units heated solely with infrared burners.

(10) The provisions of paragraphs (c)(1) and (c)(3) of this rule shall not apply to any unit that becomes subject to this rule subsequent to a revision of District Rule 219, on or after January 1, 2017, until a combustion modification or the unit is replaced, relocated, or rebuilt.

(h) Technology Assessment

(1) On or before December 7, 2015, the Executive Officer shall conduct a technology assessment and shall report to the Governing Board on the availability of burner systems and units for processes with NOx emissions of one pound per day or less.

(i) Mitigation Fee Compliance Option

(1) An owner or operator of a unit with emissions of ~~more than~~ 1 pound per day or more may elect to delay the applicable compliance date in Table 2 of paragraph (c)(1) or (c)(4) three years by submitting an alternate compliance plan and paying an emissions mitigation fee to the District in lieu of meeting the applicable NOx emission limit in Table 1.

(2) Compliance Demonstration

An owner or operator of a unit electing to comply with the mitigation fee compliance option shall:

(A) Submit an alternate compliance plan and pay the mitigation fee to the Executive Officer at least 150 days prior to the applicable compliance date in Table 2 of paragraph (c)(1) or (c)(4), and

(B) Maintain on-site a copy of verification of mitigation fee payment and District ~~AQMD~~ approval of the alternate compliance plan that shall be made available upon request to AQMD staff.

(3) Plan Submittal

The alternate compliance plan submitted pursuant to paragraphs (i)(1) and (i)(2) shall include:

(A) A completed District ~~AQMD~~ Form 400A with company name, District ~~AQMD~~ Facility ID, identification that application is for a compliance plan (section 7 of form), and identification that request is for the Rule 1147 mitigation fee compliance option (section 9 of form);

(B) Attached documentation of unit fuel use for previous 5 years, description of weekly operating schedule, unit permit ID, unit heat rating (Btu/hour), and fee calculation;

(C) Filing fee payment; and

(D) Mitigation fee payment as calculated by Equation 1.

Equation 1:

$$MF = R \times (\text{ 3 years }) \times (L_1 - L_0) \times (AF) \times (k)$$

Where,

MF = Mitigation fee, $

R = Fee Rate = $12.50 per pound ($6.25 per pound for a small business with 10 or fewer employees and gross annual receipts of $500,000 or less)

L_1 = Default NOx emission factor, 0.136 lbs of NOx/mmBtu for natural gas and LPG, and 0.160 lb/mmBtu for fuel oils

L_0 = Applicable NOx emission limit specified in Table 1 in lbs/mmBtu

AF = Annual average fuel usage of unit for previous 5 years, mmscf/yr for natural gas or gallons for liquid fuel

k = unit conversion for cubic feet of natural gas to Btu = 1,050 Btu/scf, 95,500 Btu/gallon for LPG, and 138,700 Btu/gallon for fuel oil

APPENDIX B

REFERENCES

California Environmental Quality Act (CEQA) Guidelines, codified at Title 14 California Code of Regulations, §15000 et seq.

Jacobsen, Mark Z. "Enhancement of Local Air Pollution by Urban CO2 Domes," Environmental Science and Technology, as describe in Stanford University press release on March 16, 2010. http://news.stanford.edu/news/2010/march/urban-carbon-domes-031610.html.

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APPENDIX C

REFERENCES

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SCAQMD, September 2011. Final Subsequent Environmental Assessment for Proposed Amended Rule 1147. http://www.aqmd.gov/docs/default-source/ceqa/documents/aqmd-projects/2011/final-subsequent-environmental-assessment-for-proposed-amended-rule-1147.pdf

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APPENDIX D

CEQA SOPING COMMENTS AND RESPONSES TO COMMENTS

Introduction

A CEQA scoping meeting was required for the proposed project pursuant to Public Resources Code § 21083.9(a)(2) and was held at the SCAQMD's Headquarters in conjunction with the Public Workshop on February 15, 2017. One CEQA related comment was received during the scoping meeting.

Comment #1

(From Anthony Endres / Furnace Dynamics, Inc.) The response to question III a) in Chapter 2 of the NOP/IS concludes that the proposed project would not conflict with or obstruct and applicable air quality plan and as such would have a less than significant air quality impact. However, the responses to question III f) says the quantity of NOx emission reductions foregone that may occur as a result of implementing PAR 1147 are potentially significant. These two statements seem contradict to each other.

Response to Comment #1

Question III. a) asks if the proposed project would "conflict with or obstruct implementation of the applicable air quality plan?". While PAR 1147 will allow a higher NOx limit than what is currently allowed in Rule 1147, such that there will be NOx emission reductions foregone, PAR 1147 would not be expected to obstruct implementation of the 2012 AQMP Because one ton per day of NOx emissions were allocated in the SIP set aside account for every year starting in year 2013 to year 2030 in the event that NOx emission reductions were not achieved via rule adoptions or amendments, as is the case with PAR 1147. Further, this NOx set aside account was re-evaluated and revised in the 2016 AQMP based on expected growth and the number of projects expected to take place in near future years to two tons per day for every year starting in year 2017 to year 2025 and one ton per day for every year starting in year 2026 to year 2031. As a result, even though PAR 1147 would delay NOx emission reductions, the allocations in the set aside account combined with implementation of other control measures in the 2016 AQMP will achieve NOx emission reductions to offset the NOx emission reductions foregone from PAR 1147. Therefore, the conclusion of less than significant impacts for this question is appropriate.

Meanwhile, question III. f), asks if the proposed project would "diminish an existing air quality rule or future compliance requirement resulting in a significant increase in air pollutant(s)?". Because the initial analysis of the potential effects of PAR 1147 indicated that the amount of NOx emission reductions foregone would exceed the SCAQMD's air quality significance threshold for NOx during operation, the response to this question correctly indicated that PAR 1147 would create potentially significant adverse air quality impacts. These impacts were further analyzed in the Chapter 4 of this Final SEA. The air quality analysis confirmed that the amount of NOx emission reductions foregone during operation will exceed the SCAQMD's operational air quality significance threshold for NOx starting in compliance year 2017 and beyond. Thus, the operational air quality impacts from implementing PAR 1147 are considered to be significant.

APPENDIX E

COMMENT LETTERS ON THE NOP/IS AND RESPONSES TO COMMENTS

Comment Letter #1: Gayle Totton / Native American Heritage Commission

Comment Letter #2: Diana Watson / Department of Transportation

Responses to Comments

Response to Comment Letter #1

Thank you for your comment. SCAQMD is aware of the requirements of California Assembly Bill (AB 52) that went into effect on July 1, 2015. AB 52 is promulgated in Public Resources Code § 21080.3.1(d) and requires a formal notification to all California Native American Tribes about lead agency projects that would require the preparation of a CEQA document. In response to these requirements, SCAQMD revised its environmental checklist to contain significance criteria, and a discussion of Cultural Resources impacts in response to the requirements in AB 52 to specifically consider the proposed project's potential effects on Cultural Native American Tribe resources.

A discussion of impacts from PAR 1147 relative to tribal cultural resources was included in the NOP/IS (see pages 2-19 to 2-20). As explained in the NOP/IS, since PAR 1147 only applies to reducing NOx emissions by imposing NOx emission limits on existing gaseous or liquid fuel fired combustion equipment (ovens, dryers, dehydrators, heaters, kilns, calciners, furnaces, crematories, incinerators, heated pots, cookers, roasters, fryers, closed and open heated tanks and evaporators, distillation units, afterburners, degassing units, vapor incinerators, catalytic or thermal oxidizers, soil and water remediation units), no construction activities will be required and as such, no land will be disturbed. Therefore, no significant impacts on tribal cultural resources were identified.

The Native American Heritage Commission (NAHC) has previously provided guidance to SCAQMD staff recommending that notifications to California Native American Tribes should occur at the same time the SCAQMD releases a CEQA document for public review and comment. The SCAQMD currently follows the State Clearinghouse (SCH) procedures for distributing all CEQA documents to reviewing agencies and the NAHC was specifically designated as a reviewing agency at the time the NOP/IS was released for public review and comment. In addition to following the SCH procedures for soliciting agency review of CEQA documents, SCAQMD staff also sent a copy of the NOP/IS to an interested party contact list, which included over 100 contacts for Native American Tribes. No comment letters from any contacts on the Native American Tribes list were received relative to the NOP/IS.

Responses to Comment Letter #2

As explained in the NOP/IS, PAR 1147 will resolve current Rule 1147 NOx emissions compliance issues that have been raised by businesses. It is estimated that up to 3,900 existing facilities (4,900 to 5,650 out of 6,400 existing units) within SCAB will be affected by PAR 1147. PAR 1147 proposes to extend the compliance dates for small and low use equipment based on a longer equipment lifetime, change the emission limits for certain specific equipment to address technical feasibility of meeting a 30 ppm NOx limit, add a testing exemption, and clarify exemptions for certain equipment. Therefore, PAR 1147 is expected to result in NOx emission reductions foregone of up to 0.9 ton per day starting in 2017. However, <u>while most of </u>the <u>NOx </u>emission reductions foregone will be eventually recaptured because the existing units will be regularly replaced and upgraded over time<u>, approximately 0.03 ton per day of the NOx emission reductions foregone will be permanent (see Table 4-3)</u>. PAR 1147 does not require construction of new buildings, new add-on controls, or relocation of existing facilities. Therefore, construction activities or physical changes to the existing facilities are not expected to occur.

Further, as explained in the traffic and transportation analysis in the NOP/IS (see pages 2-48 to 2-50), implementation of PAR 1147 would not have any impacts to transportation and traffic. Therefore, no traffic studies will be necessary if PAR 1147 is implemented and PAR 1147 is not expected to affect any State right of way.

APPENDIX F

COMMENT LETTERS RECEIVED ON THE DRAFT SEA AND RESPONSES TO COMMENTS

Comment Letter #1: Anthony Endres / Furnace Dynamics, Inc.

Comment Letter #2: Paul Engel

Comment Letter #1

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May 9, 2017

Ms. Barbara Radlein
Program Supervisor, CEQA Special Projects
South Coast Air Quality Management District
21865 Copley Drive
Diamond Bar, CA 91765-4178

Dear Ms. Radlein,

We have reviewed the PAR 1147 CEQA document presented March 23, 2017and have provided our comments below for your consideration. I hope these comments will be helpful in finalizing your final Environmental Assessment.

Page 3-2 Table 3-1: "Typical Uncontrolled NOx Emissions"

The emission values are in most cases extremely flawed. We have seen no evidence that any of the values in the chart are accurate and directly applicable to Rule 1147 devices.

Since the mid-1990s we have pre-tested well over 500 devices of all types of equipment including a significant number of RECLAIM sources. This also included approximately 200 parallel testing of these same devices with source test companies. The chart states the "Metal Heat Treating" and "Metal Melting Furnace" categories have uncontrolled emissions from 150-210 ppm. This is only applicable to furnaces with recuperated air systems that preheats the combustion air typically from 600°F – 1200°F with the net effect of increasing flame temperature and thus NOx emissions. We know of only one preheated air system that fits this profile in the Rule 1147 realm. That furnace was used to reclaim sand which showed a pretest value of about 156 ppm. This facility is no longer in 1147. We feel the values of the other classifications on Table 3-1 are also vastly overstated. 1-1

In the last 3.5 years, we have conducted over 225 pretests on both high and low temperature devices. The temperature ranges go from ovens that run at 300°F – 800°F and high temperature devices that can operate up to 2200°F. The non-preheated air systems are typically less than 100 ppm for high temp furnaces in the above categories. For low temperature devices such as powder coat ovens and other low temperature devices that operate well less than 1200°F the values are usually significantly less than 100 ppm. The chart states these devices are 120 ppm NOx, which on average, is probably double the actuals.

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Thus, the concern is the values indicated in the baseline inventory are dramatically overstated for Rule 1147 devices. Therefore, the overall emission reductions are overstated pursuant to rule requirements. This concern has been stated in taskforce meetings. If staff has evidence to support these values stated in Table 3-1, we would like to have them presented to us and the regulated community. That information should include the number of devices tested, what temperatures, how the tests were conducted, by whom and what b-cat categories were included to substantiate the values presented in Table 3-1.

On page 4-6 it states that the emission inventory for PAR 1147 is the inventory used for the 2008 rule adoption. As indicated above, we feel the basis for the inventory is significantly overstated.

The issue regarding the impact of a less stringent rule profile is the accuracy of the 0.9 ton per day declaration. It should be understood that a significant number of small sources are not required to report emissions on the AER program due to the di minimus nature of the emissions profile.

Even at that, with the staff utilizing a default emission factor of 130#/MMcf (101.4 ppm), the actuals are overstated.

We believe, other less than 1#/day devices would also fall into the same category of minimal emissions profile. And, as stated above there is no records of emissions due to the established criteria for inclusion of NOx data in the AERs. 1-1 cont.

On a study of the auto body industry that included 35 companies and 56 booths, with a total of 844 months of invoices evaluated the average was 0.125 #/day. The maximum input in the group was 1.2 MMBTU/hr and average was 751,516 BTU/hr.

By using this average and using PTE, the daily NOx values would be:

751,516 BTU/hr / 1050 = 715.73 cf/hr

715.73 x 24 = 17,177 cf/day / 1,000,000 = 0.017 MMcf x 130 = 2.233 #/day

Thus, by comparing the PTE of 2.233#/day to the actual average of .125#/day, the actual is only 5.6% of PTE.

The document states there are significant number of devices >1#/day. If the analysis conducted, was based on the default emission factor of 101.4 ppm and PTE, many of the devices originally thought to be >1#/day would probably fall well under 1 pound per day.

Please review the summary of multiple types of companies PTE vs. actual gas consumption included in this writeup.

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It is important to note that this information is available, in most cases, from the Districts AER (Annual Emission Report). We should compare the maximum input of each permitted device in the respective plants relative to PTE. In my evaluation *"Percent of PTE – Multiple Facilities"* the study included AERs for many clients. Some of these clients had Rule 219 equipment. I included the 219 equipment in the total maximum input calculations. Many others, emissions are so low that they are not required to report emissions. The values also include permitted and non-permitted equipment and were based on So. California Gas Company invoices. 1-1 cont.

On page 4-10 ***Relationship Between Short Term Uses and Long Term Productivity***

A statement indicates that NOx is a precursor to ozone and PM2.5. Please refer to *Final PM2.5 Calculation Methodology, October 2006*, Table 3, page 5 which states (for external combustion sources) that 99% of PM10 is actually PM2.5. Therefore, the only way to reduce the amount of PM2.5 is to shutdown equipment or become significantly more efficient. Based on our review of the low NOx technology there are decreases in efficiency, due to the higher use of excess air to reduce the hot mix temperatures and thus lower NOx. There are some increases in efficiency due to improved control. We have seen no substantive evidence that there is an imbalance in loss vs. increase of efficiency in the application of low NOx burners to 1147 devices. Therefore, since the PM10 (PM2.5) is related to gas use not NOx emission profiles, rule 1147 emission reduction requirements' will not have any substantive effect on PM2.5. 1-2

Evaluation of Alternatives:

Issues which are of the alternatives represent a balance of emissions reduction and have a major impact on the regulated community.

Issues of BACT

1. The current BACT requirements exempt the requirement for installing BACT equipment if the device emits less than 1 pound per day NOx. Thus, the extended compliance on alternative 4 maintains the requirements for BACT when the unit or burner is replaced. As long as the less than a pound per day is maintained; we believe this alternative would be the best solution. 1-3

Issues of Cost Effectiveness

1. The other item not discussed but eminently important is the issue of cost effectiveness. We have conducted many cost effectiveness analysis of devices using the Minor Source Cost Effectiveness formula. In the sources that are less than 1 pound per day the cost effectiveness values in many if not most cases far exceed $100,000/controlled ton of reduction. A number of examples exceed $1,000,000/ct. As an example, to put this in prospective, large RECLAIM 1-4

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power plant NOx reductions show cost effectiveness values of about $3,000/ct. Aside from the BACT issue at less than 1 pound per day limitation, the small devices (small companies) have an economic burden that far exceeds the large utilities and refineries. These utilities have millions of customers and thus any costs are spread over these customers – making the incremental cost to them extremely small. Small companies have few customers by comparison and the cost effectiveness is a significant burden on their profitability and ability to stay in business as well as the ability to have their businesses in California. 1-4 cont.

Table 5-2

Alternative Proposed Project, B, C and D all have the same forgone emissions of 0.9 tons/day – thus from an emission standpoint there are no differences. However, as we have previously stated the 0.9 t/d value may be overstated, thus the alternatives will have less impacts that the document defines. 1-5

Alternative B, C and D all have the same air quality impacts relating to the 0.9 tons per day, however, Alternative D indicates no recovery of emissions in the future. Since the proposed rule requires that if there is a replacement of the burner or device, compliance will be required. Thus, at some time the emissions will be reduced. However, these are mostly related to the <1#/day threshold, therefore, since they are not required to be BACT due to the limited emissions, the recovery is a moot point. As stated in the document, many of these are probably at 0.3#/day. Since the 0.3# value is based on the default emission factor of 101.4 ppm, it could be said, the actual emission reduction from retrofitting would be minimal at best. Bear in mind that if the requirement is 20 years or 25 years, since they are less than 1#/day, they are not and would not be required to retrofit the device. 1-6

BACT Issues:

Since **Alternative 4** exempts pressure washers due to the excessive cost and difficulty to retrofit (in some cases over $200,000) and there are a very limited number of these in the SCAB, the impact of exemption is marginal at best.

Alternative 4 also requires adequate recordkeeping, this is completely acceptable as an alternative measure. If the 1#/day is exceeded, retrofit is required whenever it occurs. 1-7

Amalgamation of **Alternative C and D** appears to be the best solution with minimal impact to the environment.

Conclusion: Since we believe the forgone emissions of 0.9 t/d are significantly above the actual emissions on a wide variety of devices, Alternative C and D offer the best solution, without

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placing a significant economic burden on industry in the future years. An additional consideration, since the RECLAIM program is being phased out, the emission reductions accrued the reinstallation of command and control rules from the large emitters will more than offset the estimated forgone emission from the proposed rule and Alternatives.

It is highly problematic that staff chooses to use PTE to determine the emissions profile of the grouping of 1147 devices. The net effect is to overstate the emissions as a group and thus overstate the forgone emissions – without conducting an in-depth analysis of the actual emissions of these facilities. Additionally, the staff chooses to use the default emission factor of 130#/MMcf natural gas (101.4 ppm) to quantify the emissions profile regardless of type of equipment 1-7 cont.

PAR Rule 1147: The following comments relate to the proposed PAR 1147 rule language. A revised version dated May 2, 2017. We will provide staff with comments relating to those revisions. 1-8

1147(b)(9) Infrared burners since these burners are exempted by 1153.1 (without qualification) they should be exempted from 1147

Page 1 – 1147(b)(4) Recommend the wording be changed to change of location something to the effect that *"No modification is required to an existing unit, if the equipment is the same as was permitted and operated at a previous location, provided no modification to the equipment has been made that would change rated input BTU capacity or emissions profile."* 1-9

Page 4 – 1147(c)(1)(A) The word *"relocated"* should be removed. If a unit is less than 1 pound per day and maintains documentation substantiating the classification – a 30-year limitation should not be applied. The rule does require the permit holder to provide annual maintenance to the equipment. 1-10

Table 1:

Add *Multi chambered* to the dual chamber. For example, a heat set lithography press, three heat set presses exhaust all go into an afterburner, therefore the multi chamber definition would apply. 1-11

1147(c)(6) eliminate 35 years – since these less than 1#/day devices are not required to comply with BACT and keep records, they should not have to retrofit in the future. The rule requires annual maintenance records therefore, if properly maintained, they should remain less than 1 pound per day. Also, consider since many of these are well less than 0.5 pounds per day, the future cost would be astronomical in a cost per controlled ton basis. 1-12

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1147(c)(6)(C) Read timers once per month. 1-13

1147(c)(6)(C) change "*calibrated*" to only the fuel meter not a non-resettable timer. 1-14

1147(c)(6)(C) Remove the less than 22 pounds per month an reinstate the 30#/month. 1-15

1147(c)(6)(C) Revise the timer to 50% of maximum input not maximum input. No devices in 1147 operate at 100% capacity. No device operates at PTE since all devices are controlled by a temperature controller with specific set points for a given process. See writeup on PTE and refer to the dialogue on the CEQA document relating to actual vs PTE. 1-16

Table 3 See the included chart relating to the emission factors calculated based on hour considerations for the specific input values. 1-17

Table 4 See chart to correct the hours per month that should be allow for the specific input values. 1-18

(c)(6)(F) Note the value of 7,692 cf/day is based on the default emission factor of 130#/MMcf or 101.4 ppm. The Table 3 and 4 are not based on 101.4 ppm but higher values. This is inconsistent. 1-19

(d)(7) identifies units with one dual purpose burner that both heats and incinerates VOC, toxics or PM demonstrates compliance with the following. 1-20

(d)(7)(A) If there is only one burner the only place to test is the emission stream exiting the device, thus only one test is required. 1-21

(d)(7)(B) This is no longer valid due to the chance in Table 1. 1-22

(f)(1) Remove repair, if a system is repaired to the same configuration as the original burner, no emission changes are present. Also, remove the change of location from the revision. 1-23

(f)(4) Remove the reference to 30 years. If the unit is <1#/day and is maintained per rule requirements, there is no need to replace it in 30 years since it will still be less than one pound per day. 1-24

Should you have any questions feel free to call me any time.

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Sincerely,

Anthony W. Endres
President

Enc.

cc. Dr. Philip Fine
Mr. Tracy Goss
Mr. Gary Quinn
Mr. Wayne Barcikowski

This page is an attachment and referenced in Comment #1-1 of this letter.

Percent of PTE - Multiple Facilities
Rule 1147 Companies

Type	Duration Years	Percent of PTE
Medium Forge	1	10.8%
Medium Forge	1	19.6%
Heat Treat	1	16.7%
Powder Coat	6	14.9%
Powder Coat	1	12.0%
Furnature Mfg	2	13.9%
Autobody Study	multiple	5.6%
	Average	**13.4%**

Notes:

1. The maximum of all devices were added for a total input
2. The input was converted to cubic feet x 24 x 365
3. The gas consumption was based on Gas Co invoices
4. The percentage is based on PTE vs. Actual Consumption
5. Autobody study included 56 booths, 844 months of Gas Co. invoices

This page is an attachment and referenced in Comment #1-16 of this letter.

FD

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November 19, 2015

A discussion on Potential to Emit (PTE)

Potential to Emit is defined as the maximum amount of emissions that can be generated from a device operating at maximum capacity, 100% all of the time, twenty-four hours per day, seven days a week. On an annualized basis that number would be multiplied by 365 days per year. Whereas this is a relatively simplistic approach to determining emissions, it actually is impossible for devices to operate under these conditions. They can only operate under these conditions for relative short intervals when the equipment is first fired. The reason has to do with the fact that all of the devices in Rule 1147 are based on a defined operating temperature. This is true from forging, heat treating, metal melting, powder coating, crematories, cooking ovens, etc.

For example, I have designed combustion systems for over 120 furnaces in forging, heat treating and metal melting. Categorically, no device design is based on PTE. They are based on the objective for the process; the production throughput, operating temperatures, refractory losses, etc. It boils down to the net available heat to do work in the furnace or oven, after combustion losses balanced with the production of a given product.

On direct fired forge furnaces, the typical operating temperature range can be anywhere from 800F to as high as 2250°F and they can be in the same furnace. The theoretical flame temperature under optimal air fuel ratio conditions is between 3000°F and 3100°F. To put this into perspective, carbon steel in a molten state is cast at temperatures around 2900°F to 3050°F. Thus if operated in a typical high temperature furnace you could melt metal. Since the operating temperatures are dramatically less, the firing rate overall is consequently less. Since different alloys require tight control on operating temperatures, the heat input must be precisely maintained to not metallurgical destroy the parts contained in the furnaces. For instance, titanium is finish forged at 1750°F. If the temperature goes to 1825°F, the parts are scrap. It can thus be seen that it is impossible to operate at PTE without destroying parts. This goes for any operating range.

This is true regardless of the process albeit, in the metals industry, powder coating, burn off and a plethora of other processes covered in Rule 1147. They all provide heat input to match a specific set point temperature that are required to maintain the product quality necessary to satisfy customer needs. When looking at powder coating, the low NOx burners provide an operating temperature of between 300°F and 650°F, particular powder materials require tight temperature control. If that temperature is exceeded, the powder will be burnt, rendering the parts unusable. Due to the nature of oven burners and the necessity to achieve 30 ppm, the burners typically operate at higher amounts of excess air than high temperature operations. Even

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so, the actual flame temperatures can reach over 2000°F. Again, the PTE value would be incorrect to apply as a determinate consideration of emissions and thus pound per day emission profiles.

Actual Annual Use vs. PTE: To make the determination of actual vs. PTE, we acquired So. Cal Gas Company annual use in therms, converted them to millions of cubic feet, then got to total BTU/hr maximum input of each device in the plant and correlated the actual MMcf to the potential if operated at the maximum input, 24 hours per day on an annual basis. I conducted a study to determine the correlation of PTE to actual usage on two forge plants, one very large and a medium small shop. By the above method, the large forge facility was operating at a 25% of PTE. On the smaller facility there were gas consumption limits on all of their furnaces. The actuals were 19.6% of the permit limits which was well below the devices PTE. This facility was evaluated for actual annual vs. PTE and the results showed 10.82%. I have just completed an evaluation of a couple of powder coating companies. One had an actual annual, compared to PTE of 12%. Another powder coat facility showed a six-year average of 10.49%. during the six years the annual averages ranged from 9.16% to 11.99%. It is important to understand that these facilities were operating under normal production capabilities. Some companies are single shift, others are two shift and one is a three shift operation 5 days per week. I will be conducting additional analysis on a number of other facilities and forwarding those values to staff. However, I would believe the Actual compared to PTE is going to be in the 10% - 25% range.

Included Charts: I have included a series of charts that can provide a level of understanding of the relationship of daily emissions vs. BTU input vs. hours of operation at a variety of different average firing rates. The first charts are related to the SCAQMD default emission factor of 130#/MMcf natural gas or 101.4 ppm. The first chart shows the correlation of values assuming 100% of the capacity of the combustion system or PTE. The next three charts show the same correlations of firing rate to hours of operation at 50% of PTE and 20% of PTE. The fourth chart shows how high the BTU rating could be per hour of operation and still stay under 1#/day of NOx. The last three charts show the same data but based on a lower emission value of 60 ppm.

It can be seen the lower emission values reflect a substantially lower pound per day emission value. This is for illustrative value only. However, it should be understood that few devices operate anywhere near the default ppm values. In the last 3 years I have conducted approximately 175 pretests (mostly on 1147 devices) using a Testo 350 combustion analyzer. I have also parallel tested about 70 official source tests and my readings are typically less than 2 ppm deviation from the official source test results. I have yet to see any device that operated near the 101.4 ppm level. The lower temperature devices such as ovens are even lower relative to the default emission factor. Thus even with the values shown on the first 4 charts, the pound per day values are overstated.

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I believe a collaborative effort on behalf of District staff and industry representatives can arrive at a reasonable means of determining what constitutes one pound per day usage. Perhaps the simplest approach could be the use of non-resettable timers on devices, with a limit of X hours per day for a given BTU input. Obviously this would have to be backed up with logs of hours of operation that could be verified by an inspector. If, as was suggested in the 1147 Task Force Meeting, an exemption (or an extended compliance date) be given to devices operating at less than a pound per day, verification is essential. There could be other means of quantification of daily emissions – these need to be discussed in a meaningful way to determine what works for the District and industry.

As always, we appreciate the opportunity to work with staff to assist in developing a bridge of understanding of how industry actually operates. Should you have any questions regarding this subject, please feel free to engage me in a meaningful dialogue to assist in developing rules that relate to real-world conditions.

Sincerely,

Anthony Endres
President

This page is an attachment and referenced in Comments #1-17, 1-18 and 1-19 of this letter.

Review of PAR 1147 Table 3 and 4

Table 3 - Small and Low Use Unit Daily Operating Limits

Converting to Actual ppm NOx

BTU/hr	Hours/day	#/day	Actual ppm
325,000 - 400000	16	0.792	127.97
400,001 - 500,000	14	0.867	117.00
501,000 - 800,000	8	0.792	127.97
800,001 - 1,000,000	6	0.743	136.50
1,000,001 - 1,200,000	5	0.743	136.50

Notes:
1. "#/day" is based on 101.4 ppm (130#/MMcf)
2. "Actual ppm" corrilates #/day vs. hours converted back to ppm
3. The highest value was used for actual ppm

Table 4 - Small and Low Use Unit Monthly Operating Limits

Converting to Proper Monthly Hourly Limit

BTU/hr	PAR 1147 Hours/Month	#/month	Hr/mo = 29.96#/mo	#/mo
325,000 - 400000	352	17.43	605	29.96
400,001 - 500,000	308	19.07	484	29.96
501,000 - 800,000	176	17.43	302	29.96
800,001 - 1,000,000	132	16.34	242	29.96
1,000,001 - 1,200,000	110	16.34	202	29.96

Notes:
1. Cubic feet per day natural gas = 7,682
2. Hr/mo = 29.96 #/mo is based on 1050 BTU/cf and 130#/MMcf
3. The highest value was used for actual ppm

Comment Letter #2

From: Paul Engel <paulkengel@gmail.com>

Sent: Thursday, May 11, 2017 12:10 PM

To: Barbara Radlein

Cc: Anthony Endres; Gerry Bonetto

Subject: Proposed Amendment Rule 1147

Barbara

I was in receipt of Mr Endres' comments to CEQA document and proposed Rule 1147. I have been involved with permitting and compliance consulting since 1988. I find that Mr. Endres' comments reflects more correctly actual operations of combustion equipment versus theoretical rated design values. I have worked and continue to work with printers with natural gas-fired dryers for heat-set web-fed printers within AQMD jurisdiction. PTE is an intellectual value with minimal reflection on actual operations. The rated heat input is only experienced for cold start-up to get the oven to operating conditions quickly. If the printers operated at the rated maximum heat inputs. the printed product would be unusable because the printed product would be damaged because of curdled or blistered substrate or in fact would likely cause press fires. 2-1

Thank you for considering the revisions to Rule 1147.

Paul Engel

714-473-8036

Responses to Comments

Responses to Comment Letter #1

Response 1-1

The baseline emissions shown in Table 3-1 of the Draft SEA are not based on the emission factors listed in the table. Table 3-1 originates from the Environmental Assessment (EA) for Rule 1147 adoption in December 2008 (referred to herein as the December 2008 Final EA). The information contained in the December 2008 Final EA, including Table 3-1, was relied upon and is necessary to complete the analysis in this SEA. The total emissions presented in Table 3-1 is originally from the 2007 Air Quality Management Plan and are based on information generated by local gas utilities which in turn were provided to the California Public Utilities Commission and Energy Commission. This information was then provided to the California Air Resources Board (ARB) who, along with SCAQMD inventory data, relied upon this information to prepare an emission inventory. The emission factors listed in Table 3-1 are from U.S. EPA and were presented in the table only to illustrate the range of emissions from these types of equipment. The emission estimates for the different categories were prorated based on the estimate of the number of equipment in each category. This information was previously communicated to the commenter and other stakeholders during rule development for the December 2008 adoption of Rule 1147 and later during the September 2011 amendments to Rule 1147.

The commenter states that there are only a few units with emissions greater than one pound per day. SCAQMD staff agree that most equipment affected by Rule 1147 would have emissions less than one pound per day. As described in the Staff Report for PAR 1147, at least 75 percent of the affected units have emissions less than one pound per day and that number could be as high as 90 percent. However, as a group, these units generate a significant amount of emissions. Consequently, emission reductions are needed to achieve compliance with the ambient air quality standards for ozone and NOx.

While it is true there are other sources information of emissions including the SCAQMD annual emission reporting, it is not always possible to use these other sources. As noted by the commenter, few businesses are required to report under the SCAQMD's Annual Emissions Reporting program. In addition, most of the information collected is aggregated and it is not possible to identify individual equipment fuel use and emissions. The analysis for any rule development project estimates average and range of emissions based on appropriate emission factors that represent average emissions from different categories of equipment as well as estimates of hours of operation and usage. Some equipment will have lower emissions but other equipment will have above average emissions. Both the Staff Report and SEA for PAR 1147 do not use potential to emit (PTE) to estimate emissions. However, this information can be adjusted to estimate actual emissions and is available for many equipment.

Because the fuel usage, emission factors or emission test results, and PTE as calculated for the SCAQMD permit were not provided by the commenter, it is not possible for SCAQMD staff to evaluate the table of emissions estimates that was provided in the attachment to this letter. In addition, the weekly, daily, and hourly operation schedules were not provided. Daily emission estimates from annual data can vary significantly depending upon the actual operating schedule and other factors. For example, dividing annual emissions by 365 days per year when a unit operates 250 days per year or less can substantially underestimate the quantity of daily emissions. Staff has estimated that a typical spray automobile repair spray booth has NOx emissions less than 0.3 pound per day for an average one shift per day operation. However, some units process many more cars per day in one shift than others and some units are used for more than one shift per day. Emissions also vary depending upon the type of booth. In addition, new booths are more efficient, but there are many older booths in the SCAQMD which will have higher emissions.

The estimate of NOx emission reductions foregone for PAR 1147 is expected to range between 0.6 and 0.9 ton per day of NOx which will be made up over time as new units replace old units. For the impact analysis in this SEA, it is necessary to estimate the worst case impacts where there is uncertainty regarding the impacts of the proposed project and its alternatives. Thus, the worst case analysis for CEQA purposes relies on the 0.9 ton per day of NOx emission reductions foregone.

Response 1-2

PM2.5 is both directly emitted and chemically produced from its precursors which are nitrogen oxides, sulfuric oxides and volatile organic compounds. Research in atmospheric chemistry and EPA guidelines clearly define that NOx is a PM2.5 precursor. PM2.5 monitoring and modeling is required to be chemical specific (EPA, 2014) for demonstration of attainment in the AQMP and State Implementation Plan (SIP)[6]. The chemical components defined include nitrate, sulfate, organic carbon, elemental carbon, ammonia, crustal components, salt, and others. In the South Coast Air Basin, the majority of ambient PM2.5 are produced by chemical reactions from NOx, SOx and reactive organic materials. Reductions in NOx emissions from any source result in reductions of PM2.5 ambient concentrations.

Response 1-3

The commenter refers to Alternative 4 in the letter, but the Draft SEA identifies the alternatives as Alternative A, B, C and D. Alternative D is the alternative that would allow compliance with the NOx limit provided that records can demonstrate that emissions would be less than one pound per day. However, the option to allow for the demonstration that emissions would be less than one pound per day is only one component of Alternative D. When taking into account all of the other components that comprise Alternative D, the overall impacts when compared to the proposed project is that Alternative D would be the least stringent alternative and would not be equivalent to BACT.

Response 1-4

Cost-effectiveness is addressed in the Staff Report and Socioeconomic Analysis, but not in the Draft SEA. The analysis shows that PAR 1147 would be less costly than the existing rule. It should be noted that stakeholders agreed that the Technology Assessment's cost and cost-effectiveness analysis for small units (< 1 lb/day) should result in exemptions and compliance delays.

[6] U.S. EPA, 2014, Draft Modeling Guidance for Demonstrating Attainment of Air Quality Goals for Ozone, PM2.5, and Regional Haze.

Stakeholder input on cost for larger units (> 1 lb/day) was at times consistent with staff's estimates when sufficient detail was provided by the stakeholder. However, comments with examples of cost-effectiveness that were significantly higher could not be verified by SCAQMD staff. In these instances, the basis and details of costs provided by stakeholders were not transparent and staff along with the independent reviewer of the Rule 1147 Technology Assessment were not able to complete evaluation of the information provided. The cost-effectiveness analyses provided by stakeholders were not always consistent with permitted equipment operating hours, permit requirements, and recommendations from the ABT review of the SCAQMD cost analyses (i.e., a 2014 third party review of SCAQMD cost analyses). In addition, rebates from utilities for rebuilt units were excluded from cost information provided by stakeholders.

Response 1-5

While it may appear that because the NOx emission reductions foregone will be 0.9 ton per day for Alternatives B, C, and D, the quantity of emission reductions foregone is not the only metric that separates the alternative's characteristics from each other. These three alternatives vary by whether the NOx emission reductions foregone will be all temporary, all permanent, or a combination thereof, and these effects are dependent upon the varying equipment category components. Further, the timing of the when NOx emission reductions foregone will occur, and when any of the emission reductions will be recovered also vary amongst these three alternatives.

For example, unlike the proposed project and Alternative C, Alternative B does not exempt any units less than 325,000 BTU/hour from any limit. Further, Alternative B has a 25-year compliance schedule which is shorter than the 30-year compliance schedule in the proposed project. Also, Alternative B does not have any permanent emission reductions foregone and the 0.9 ton per day of the emission reductions foregone are expected to be fully recovered. Both Alternative C and D have no age requirement and provide additional exemptions for all pressure washers, and therefore both Alternative C and D will have more permanent emission reductions foregone comparing to the proposed project.

Thus, contrary to the comment, these differences, while they may seem subtle, define the characteristics of Alternative B, C, and D and do not overstate the impacts that may occur if any are implemented.

Response 1-6

As explained in Response 1-5, Alternatives B, C and D do not have the same air quality impacts as demonstrated in Table 5-2 of this Final SEA. See Response 1-5.

Response 1-7

The overall impacts to the environment from implementing Alternatives C and D is explained in Response 1-5. It is important to note that of the total 0.9 ton per day of NOx emission reductions foregone, the portion that can be attributed to pressure washers under Alternatives C and D is approximately 36 pounds per day of NOx emission reductions foregone, which SCAQMD staff believes is not a "marginal" amount (see Table 5-3).

Response 1-8

Units fired solely with direct fired infrared burners are exempt from the emission testing requirement if certain operating parameters are met. This requirement was added to PAR 1147 to be consistent with SCAQMD Rule 1153.1 – Emissions of Oxides of Nitrogen From Commercial Food Ovens.

Response 1-9

SCAQMD staff believes that the current definition of relocation in PAR 1147 accurately describes the actions associated with relocating equipment and is consistent with other SCAQMD rules.

Response 1-10

An equipment life of 30 years provides sufficient time for most units to be replaced. If an owner chooses to modify a very old unit to comply with the rule emission limit, the owner has that option. Thirty years is beyond the time an owner would have loan payments for a unit and the time a unit can be depreciated for tax purposes. Compared with new equipment, after 10 years of use, most units require major maintenance in order to continue operation. If an owner chooses to buy used equipment, to install in a facility, then that old unit should meet the same emission limit as a new unit. This approach is consistent with federal, state, and SCAQMD's New Source Review requirements per Regulation XIII which is applicable to relocating units. In addition, units with emissions of one pound per day or more must comply with BACT upon relocation.

Response 1-11

Staff has modified Table 1 in PAR 1147 to address the concern raised in this comment.

Response 1-12

This issues raised in this comment repeat the sentiments expressed in Comments 1-4 and 1-10. Please see Responses 1-4 and 1-10.

Response 1-13

Business owners have that option in the both the current version of Rule 1147 and in PAR 1147 to read the timers monthly, but they may also choose to document the meter readings on a daily basis.

Response 1-14

PAR 1147 has been crafted to be consistent with other requirements contained in other SCAQMD rules, policies, and standard permit conditions. Please also see Response 1-13.

Response 1-15

PAR 1147 has been crafted to be consistent with other requirements contained in other SCAQMD rules, policies, and standard permit conditions. Please also see Response 1-13.

Response 1-16

The screening tables in PAR 1147 are one way to document NOx emissions of less than one pound per day. However, many other options are available. In addition, there are many units that operate at 100 percent because the burners turn on at 100 percent of the firing rate and then turn off when the temperature set point is reached. For these units, the screening tables are the simplest method to document emissions. The hours in Tables 3 and 4 of PAR 1147 are based on the emission factors referenced by the commenter but are slightly less than the hours from those calculations. The emission factor referenced is an average and some equipment will have higher emissions. The tables also include a safety factor so that equipment owners know when they should consider using another more accurate method to document emissions of less than one pound per day.

Response 1-17

This issues raised in this comment are addressed in Response 1-16.

Response 1-18

This issues raised in this comment are addressed in Response 1-16.

Response 1-19

This issues raised in this comment are addressed in Response 1-16.

Response 1-20

The paragraph in PAR 1147 that is referenced by the commenter is incorrect. However, consistent with other changes in PAR 1147 for incineration type devices, PAR 1147 no longer identifies dual purpose burners as a two-function device with a different emission limit when performing emission testing. This change to PAR 1147 address the recommendations in Comments 1-20 through 1-22.

Response 1-21

The paragraph in PAR 1147 that is referenced by the commenter is incorrect. However, consistent with other changes in PAR 1147 for incineration type devices, PAR 1147 no longer identifies dual purpose burners as a two-function device with a different emission limit when performing emission testing. This change to PAR 1147 address the recommendations in Comments 1-20 through 1-22.

Response 1-22

The paragraph in PAR 1147 that is referenced by the commenter is incorrect. However, consistent with other changes in PAR 1147 for incineration type devices, PAR 1147 no longer identifies dual purpose burners as a two-function device with a different emission limit when performing emission testing. This change to PAR 1147 address the recommendations in Comments 1-20 through 1-22

Response 1-23

Paragraph (f)(1) of PAR 1147 identifies documents that must be made available to the SCAQMD in order to determine if a modification is a repair, a change in burner output, or a burner replacement. Rule 1147 requires maintenance records to be kept by the owner at the facility location.

Response 1-24

Contrary to the comment, there is no age requirement in paragraph (f)(4) of PAR 1147. See Response 1-10 for a discussion on the age requirement that is contained in PAR 1147.

Response to Comment Letter #2

Response 2-1

Thank you for your comment. The issues raised in this comment letter repeat the sentiments expressed in Comment Letter #1. Please refer to Responses 1-1 through 1-24.

ATTACHMENT I

PROPOSED AMENDED RULE 1147 – NOx REDUCTIONS FROM MISCELLANEOUS SOURCES

June 2, 2017

Governing Board Meeting

Rule 1147 Background

- Rule 1147 was adopted December 2008
- Proposed amendments reflect findings from Rule 1147 Technology Assessment which considered availability of low-NOx burner systems for small and low emissions sources (< 1 pound/day)
- Proposed amendments provide regulatory relief for over 5,000 small combustion units from compliance limits that become effective **7/1/2017**

Regulatory Relief for Small NOx Sources

Low-Emitting Combustion Units (< 1 Pound per Day)

- Removed in-use requirement
- Must meet emission limit when unit or burner is replaced
- Extend replacement time from 20 to 30 years

Low Use Combustion Units (<325,000 BTU/Hr)

- Removed NOx emission limit for units <325,000 BTU/hour
- No longer required to meet new or in-use NOx emission limit

Recognizes Technology Limitations for Specific Applications

NOx Limit for Certain Equipment Categories

- Increased NOx limit from 30 to 60 ppm for:
  - Afterburners
  - Incinerators, and
  - Burn-off ovens
- Changes consistent with Technology Assessment

Pressure Washers and Tanks

- Exempt existing in-use pressure washers and tanks
- Not technically feasible to directly retrofit these equipment, therefore not cost-effective

Infrared burners

- Testing exemption for infrared burners

Compliance Flexibility

Alternative Compliance Demonstration

- Provides alternative paths to demonstrate compliance < 1 lb/day such as fuel use or burner hours of operation

Vendor Warranty Option

- Small unit option to use vendor warranty in lieu of certification or source testing (Units < 2 mm Btu/hour)

Testing Options

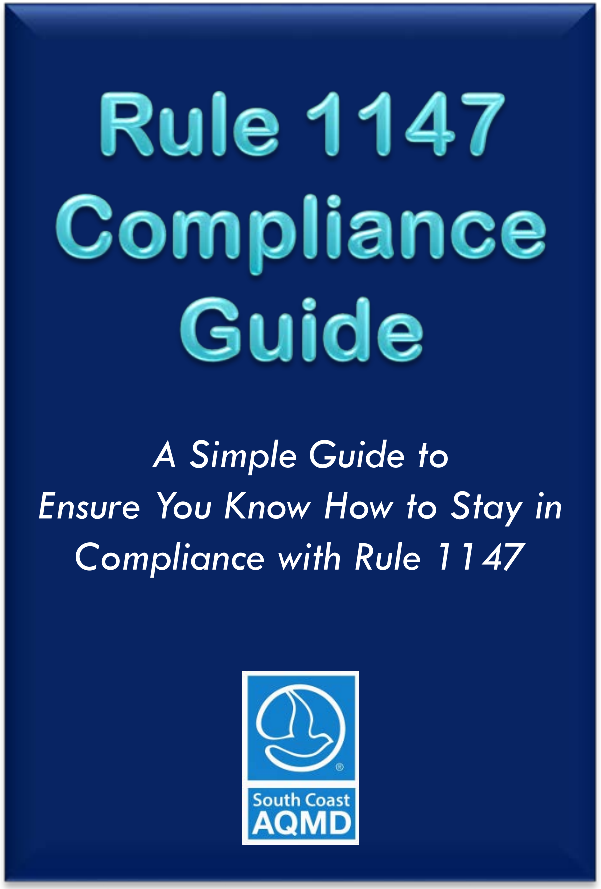
- Additional testing option for low temperature ovens

Emissions Reductions

- Overall delay in emission reductions of about 0.9 tons per day NOx (removing in-use requirement for units < 1 pound/day)
  - Affecting approximately 4,900 to 5,600 pieces of equipment
- Emission reductions foregone is < 0.03 tons per day NOx associated with <325,000 btu/hr units

Outreach

- Stakeholders have requested staff provide compliance assistance to avoid confusion
  - particularly by smaller facilities
  - including available burner options
- Staff has agreed to work with stakeholders
  - Resolution commitment
- Staff has already initiated first meeting with key stakeholders to develop a two-phase approach



Recommendation

- Adopt the Resolution:
  - Certifying the Final Subsequent Environmental Assessment;
  - Amending Rule 1147; and
  - Directing staff to work with stakeholders to conduct outreach to help guide facilities through the applicable rule requirements